SD-99311-01

31

SHEET INDEX

ISSUE NO.

CONTENTS	SHEET NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	SHEET NO.
SHEET INDEX SUPPORTING INFORMATION	A1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																															A1
SHEET INDEX	A2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																															A2
APPARATUS INDEX	A3	1	2	3	4	[illegible]	6	7	8	9	[illegible]	10	12	12	12	15	16	17	18	19	20																															A3
	A4	1	2	2	4	4	6	7	8	9	10	11	12	12	14	15	16	17	17	19	19																															A4
LEAD INDEX	A5															15	16	16	16	19	20																															A5
OPTION INDEX	A6															15	16	17	18	19	20																															A6
FS 1 HYBRID SUPERVISORY OSCILLATOR AND CURRENT CONTROLLED OSCILLATOR	B1A	1	2	3	4	5	6	7	8	9	10	10	12	12	12	15	15	17	17	19	19																															B1A
	B1B															15	15	17	17	19	20																															B1B
FS 2 MULTITONE PREAMPLIFIER	B2	1	2	3	4	5	5	7	7	7	[illegible]	10	10	10	10	15	15	17	17	17	17																															B2
FS 3 LIMITER & DETECTOR	B3	1	2	3	4	5	5	7	7	7	[illegible]	10	10	10	10	10	10	17	17	17	17																															B3
FS 4 DC & AUDIO GATE	B4	1	2	3	4	4	4	7	7	7	10	10	10	10	10	10	10	10	10	10	10																															B4
FS 5 MULTITONE RECEIVER READOUT	B5	1	2	3	4	4	4	7	7	7	[illegible]	10	12	12	12	12	12	12	12	12	20																															B5
FS 6 MULTITONE TRANSLATOR	B6	1	2	3	4	4	4	7	7	9	9	9	9	9	9	15	16	17	17	17	17																															B6
FS 7 REPEAT COIL CUT IN, SUPERVISION, MONITORING AND TEST GROUND	B7	1	2	3	4	5	6	7	8	9	10	10	12	12	12	15	16	17	18	19	20																															B7
FS 8 SUBSCRIBER RELAY TEST & STATION RINGER TEST	B8	1	2	3	4	4	4	6	6	6	10	10	10	10	10	15	15	17	17	17	20																															B8
FS 9 COIN TESTS, FEMF & VM REV	B9	1	2	3	4	5	6	6	6	6	10	10	12	12	12	12	12	12	12	12	20																															B9
FS 10 TEST BATTERY, REVERSE, DIAL TONE TEST / PERMANENT SIGNAL RELEASE	B10	1	2	3	4	4	6	7	7	7	10	10	10	10	10	15	15	15	18	19	20																															B10
FS 11 RINGING CONTROL CKT	B11A*	1	2	3	4	4	6	6	6	9	10	11	12	12	14	15	15	15	15	19	20																															B11A
	B11B*																			19	19																															B11B
FS 12 DIAL PULSE REPEATING AND RECEIVER OFF-HOOK TONE	B12	1	2	3	4	5	6	7	7	7	7	7	12	12	12	15	16	16	18	19	20																															B12
FS 13 REMOTE TEST TRUNK CONTROL	B13A	1	2	3	4	5	6	7	7	9	10	10	12	12	12	15	16	16	16	16	20																															B13A
	B13B																16	16	18	19	20																															B13B
FS 14 POSITIVE TEST BATTERY FS 15 NEGATIVE TEST BATTERY FS 16 POWER SUPPLY	B14	1	2	3	4	4	6	7	7	7	7	7	7	7	7	15	16	17	17	19	20																															B14
FS 17 EXTENDED TEST TRUNK CONTROL	B15															15	16	17	17	19	20																															B15
	B16															15	15	17	18	19	20																															B16
FS 18 2-WAY AMPLIFIER	B17															15	15	15	15	19	19																															B17
FS 19 NIGHT TEST TRANSFER	B18															15	16	17	17	19	20																															B18
APP FIG. 1	C1	1	2	3	4	5	6	7	7	[illegible]	[illegible]	10	10	10	10	15	16	17	17	17	20																															C1
APP FIG. 2	C2	1	2	3	4	4	4	[illegible]	[illegible]	[illegible]	[illegible]	10	10	10	10	10	[illegible]	[illegible]	10	10	20																															C2
APP FIG. 3	C3	1	2	3	4	5	5	7	[illegible]	[illegible]	[illegible]	10	12	12	12	15	16	17	[illegible]	[illegible]	19																															C3
	C4	1	2	3	4	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10	12	12	12	15	16	17	17	19	19																															C4
	C5	1	2	3	4	5	6	7	[illegible]	9	[illegible]	10	12	12	12	15	16	17	[illegible]	[illegible]	20																															C5
APP FIG 4,5,6	C6	1	2	3	4	4	6	6	6	6	6	[illegible]	12	12	12	15	15	15	15	15	15																															C6
APP FIG 7	C7															15	15	17	17	19	20																															C7
APP FIG. 8,9	C8															15	16	16	18	19	20																															C8
CIRCUIT NOTES 101-4	D1A	1	2	2	4	4	6	7	8	9	10	11	12	12	14	15	16	17	18	19	20																															D1A
CIRCUIT NOTES 105-END EQUIPMENT NOTES	D1B															15	15	17	18	19	19																															D1B
INFORMATION NOTES 301-2 & 303-END TRANSMISSION TEST REQTS CROSS CONNECTION NOTES	D2			3	4	4	6	7	7	9	10	10	10	10	10	15	16	17	17	19	19																															D2
SC 1 ACTIVATION OF CKT	E1							7	7	7	10	10	10	10	10	10	10	10	10	19	19																															E1
SC 2 ESTABLISHING A TEST CONN TO SUBSCRIBERS LINE	E2							7	7	7	10	10	10	10	10	10	10	10	10	10	10																															E2
	E3							7	7	7	10	10	10	10	10	10	10	10	10	19	19																															E3
	E4A							7	7	7	10	10	10	10	10	10	10	10	10	19	19																															E4A
	E4B																			19	19																															E4B
SC 2A ESTABLISHING A TEST CONN TO EXTENDED REM TESTING CKT	E4C																			19	19																															E4C
SC3 GENERAL OPERATE AND RESTORE ORDER RESPONSE	E5							7	7	7	10	10	10	10	10	10	10	10	10	10	10																															E5
SC4 (REV)KEY OPERATE RESPONSE SC5 (REV)AND(RCCI)KEY RESTORE RESPONSES	E6										10	10	10	10	10	10	10	10	10	10	10																															E6
SC6 DISCONNECT	E7															15	15	15	15	15	15																															E7

* SECTION B SHEETS WITH SUFFIX (A) WERE FORMERLY WITHOUT A SUFFIX LETTER.

SUPPORTING INFORMATION

CATEGORY	NO.
EQUIPMENT DRAWINGS	J93016-CH,CJ, CK,DC,DL
	ED-92956-10 ED-99435-( ) ED-99436-( ) ED-99437-( ) ED-99438-( )
EQUIPMENT DESIGN REQT	J93016
KEYSHEET INFO	SD-90472-01

DWG ISSUE	CD ISSUE	DATE ISSUED	[illegible]	APPD
1	1	6-24-64	J.K GAS	JWO RMW POB
2A	2A	2-16-65	RE NC	JEK RMW POB
3A	3A	10-25-65	NC NC	KES RMW POB
4D	3A APP 1D	10-25-65	NC NC	KES RMW POB
5A	3A APP 2A	1-24-67	DS SFL GAS	JEK MR POB
6B	3A APP 3B	1-24-67	DS SFL GAS	JEK MR POB
7A	4A	5-2-68	DS NC LL	GJB WAM PD
8AC	4A APP 1AC	5-2-68	DS NC LL	GJB WAM PD
9B	4A APP 2B	5-2-68	DS NC JRB LL	GJB WAM PD
10B	5B	11-12-69	ATD GAD WE	KES AMT PD
11A	5B APP 1A	9-23-70	RPR PJS CED	KRF LCB SEB
12B	5B APP 2B	4-20-71	RMM SAK EWS	KRF LCB SEB
13AR	5B APP3AR	4-20-71	RPR SAK JAS	KRF LCB SEB
14A	5B APP4A	6-9-71	ROZ PJS EWS	KRF LCB SEB
15D	6D	6-21-73	RPR SAK EWS	KRF LCB SEB
16D	6D APP 1D	2-12-74	TFO SAK RLS	KRF LCB SEB
17B	6D APP 2B	11-15-74	EC SAK RLS	AM PLS SEB
18B	6D APP 3B	1-24-75	TFO PJS EWS	ALT PLS SEB
19AC	7AC	10-1-75	HEH SAK EWS	ALT OBD SEB
20B	7AC APP 1B	2-18-77	PHG PJS EWS	MHK OBD EWP

HW

SHEET INDEX NOTES

1. WHEN CHANGES ARE MADE IN THIS DRAWING, ONLY THOSE SHEETS AFFECTED WILL BE REISSUED.
2. THIS SHEET INDEX WILL BE REISSUED AND BROUGHT UP TO DATE EACH TIME ANY SHEET OF THE DRAWING IS REISSUED, OR A NEW SHEET IS ADDED.
3. THE ISSUE NUMBER ASSIGNED TO A CHANGED OR NEW SHEET WILL BE THE SAME ISSUE NUMBER AS THAT OF THE SHEET INDEX.
4. SHEETS THAT ARE NOT CHANGED WILL RETAIN THEIR EXISTING ISSUE NUMBER.
5. THE LAST ISSUE NUMBER OF THE SHEET INDEX IS RECOGNIZED AS THE LATEST ISSUE NUMBER OF THE DRAWING AS A WHOLE.

ISSUE 20B

SD-99311-01 1N10

COMMON SYSTEMS

REMOTE TESTING CIRCUIT - FAR END

FOR STEP-BY-STEP, CROSSBAR NO. 1, CROSSBAR NO. 5, PANEL OR ESS OFFICES

(REM TST) ②

AT&TCO STANDARD

S -99311-01-A1

82 SHEETS

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

PRINTED IN U.S.A.

SD-99311-01-A1

SHEET INDEX (CONT)

CONTENTS	SHEET NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	SHEET NO.
CIRCUIT REQTS TABLE — TO GTI	F1	1	2	3	4	4	6	6	6	9	9	9	9	9	9	15	15	15	15	15	15																															F1
CIRCUIT REQTS TABLE — HR-PRR	F2	1	2	3	4	4	4	7	7	9	9	9	12	12	12	15	16	16	16	16	16																															F2
CIRCUIT REQTS TABLE — +R-TP	F3	1	2	3	4	4	4	4	4	9	10	10	12	12	12	15	15	15	15	19	19																															F3
CIRCUIT REQTS TABLE — TRG-XN / TIMING REQUIREMENTS	F4	1	2	3	4	4	6	7	7	7	10	10	10	10	10	15	15	17	17	17	17																															F4
CAD 1, P/O CAD 2	G1	1	2	3	4	4	6	7	7	9	10	10	10	10	10	15	16	17	17	19	20																															G1
PART OF CAD 2	G2	1	2	3	4	4	6	7	7	9	10	10	10	10	10	15	16	17	17	17	17																															G2
CAD 3	G3	1	2	3	4	5	6	7	7	9	10	11	12	12	14	15	16	17	18	19	20																															G3
CAD 4	G4	1	2	3	4	5	6	7	3	3	10	10	12	12	12	15	16	17	18	19	19																															G4
CAD 5,6 & 7	G5						6	6	6	6	10	10	12	12	12	12	12	17	17	17	17																															G5
CAD 8	G6															15	16	17	17	19	19																															G6
CAD 9,10,11,12,13	G7															15	16	17	17	19	19																															G7
BD1 FS BLOCK DIAGRAM	H1						6	6	6	6	6	6	6	6	6	6	6	6	6	6	6																															H1
BD 2,3,4	H2															15	15	15	15	19	19																															H2
BD 5,6	H3															15	15	15	15	19	19																															H3
CPS 1 SUPV OSCILLATOR & BIAS AMP	J1	1	2	3	4	4	4	7	7	7	7	7	12	12	12	12	12	12	12	12	12																															J1
CPS 2 MULTITONE PREAMPLIFIER	J2A							7	7	7	7	7	7	7	7	7	7	7	7	7	7																															J2A
	J2B							7	7	7	7	7	7	7	7	15	15	15	15	15	15																															J2B
	J2C*	1	2	2	4	4	6	7	7	7	7	7	7	7	7	15	15	15	15	15	15																															J2C
CPS 3 LIMITER & DETECTOR	J3A							7	7	7	7	7	7	7	7	7	7	7	7	7	7																															J3A
	J3B							7	7	7	7	7	7	7	7	15	15	17	17	17	17																															J3B
	J3C*	1	2	2	4	4	6	7	7	7	7	7	7	7	7	15	15	15	15	15	15																															J3C
CPS 4 LIMITER & DETECTOR	J4A							7	7	7	7	7	7	7	7	7	7	7	7	7	7																															J4A
	J4B							7	7	7	7	7	7	7	7	15	15	17	17	17	17																															J4B
	J4C*	1	2	2	4	4	6	7	7	7	7	7	7	7	7	15	15	15	15	15	15																															J4C
CPS 5 LIMITER & DETECTOR	J5A							7	7	7	7	7	7	7	7	7	7	7	7	7	7																															J5A
	J5B							7	7	7	7	7	7	7	7	15	15	17	17	17	17																															J5B
	J5C*	1	2	2	4	4	6	7	7	7	7	7	7	7	7	15	15	15	15	15	15																															J5C
CPS 6 OR-GATE	J6	1	2	3	4	4	4	7	7	7	7	7	12	12	12	12	12	12	12	12	12																															J6
CPS 7 OR-GATE	J7	1	2	3	4	4	4	7	7	7	7	7	7	7	7	7	7	7	7	7	7																															J7
CPS 8 AND GATE	J8	1	2	3	4	4	4	7	7	7	7	7	7	7	7	7	7	7	7	7	7																															J8
CPS D1 TIMING CIRCUIT	J9						6	6	6	6	10	10	10	10	10	10	10	10	10	10	10																															J9
CPS D3 TIMER	J10							7	7	7	10	10	10	10	10	10	10	10	10	10	10																															J10
CPS 9 RING TRIP	J11A												12	13	13	13	13	13	13	19	19																															J11A
	J11B																			19	19																															J11B
CPS 10 DC TO DC CONVERTER	J12												12	12	12	12	12	12	12	12	12																															J12

* SECTION J SHEETS WITH SUFFIX (C) WERE FORMERLY WITHOUT A SUFFIX LETTER.

DRAWING ISSUE	
1	J.K. GRS ...
2A	RE NC POB
3A	NC NC POB
4D	NC NC POB
5A	DS SM POB
6B	DS SFL GAS POB
7A	
8AC	
9B	
10B	
11A	
12B	
13AP	
14A	

ISSUE 20B HW

REMOTE TESTING CIRCUIT - FAR END (2)

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

SD-993 -01-A2

SD-99311-01-A2

P/O APPARATUS INDEX

DESIG	CPS	APP FIG NO	APP FIG SH NO
CIRCUIT PACKS			
24V	10	3	C5
ABC	03	1	C1
AND	8	1	C1
BIAS AMP	1	1	C1
GRP A	3	1	C1
GRP B	4	1	C1
GRP C	5	1	C1
ORI	6	1	C1
OR2	7	1	C1
PREAMP	2	1	C1
RT	9	3	C5
SO	1	1	C1
TF	03	8	C8
TMR	CF1	3	C5

DESIG	LOCATION FS	APP FIG	EQPT
RELAYS			
3WD	13A/C2	3	
3WOR	13A/H2	3	
60V	10C8	3	
60VR	10F8	3	
+1	5B5	2	
A2	5B5	2	
A3	5C5	2	
A4	5D5	2	
A5	5D5	2	
ANS	1A/A1	3	
BI-4	5E2	2	
B5	5F1	2	
C1	5G5	2	
C2	5G5	2	
C3	5H5	2	
C4	5H5	2	
CC	9E2	3	
CCR	9G2	3	
CN	9G6	3	
CR	9F2	3	
CRR	9H2	3	
CT	1B/G2	1	
CTR	1B/F2	1	

DESIG	LOCATION FS	APP FIG	EQPT
RELAYS			
D	13A/C6	3	
DIS	1B/E2	3	
DL	12F8	3	
DLI	12G8	3	
DP	12F2	3	
DPI	12F8	3	
DS	12CI	3	
DS	12C	3	
DSI	12H3	3	
E	1A/E1	3	
EI	1B2	8	
ED	16A8	7	
EDI	16D4	7	
ELL	15G5	7	
ETK	16D9	7	
ERT	16A2	7	
ERTR	16C3	7	
ERTS	1503	7	
ERV	16A5	7	
F	9C2	3	
FR	9G1	3	
G	7G5	3	
GR	7F5	3	
GT	4A8	1	
GTI	5A8	1	
HR	13B/F1	7	
IN	13A/E2	3	
INR	13A/A2	3	
K1A	5A1	2	
K1C	5G2	2	
K2A	5B1	2	
K2C	5G2	2	
K3A	5B1	2	
K3C	5G2	2	
K4A	5C1	2	
K4C	5G2	2	
K5A	5D1	2	
K5C	5C9	2	
KP	7H0	3	
KPI	7C5	3	
KPI	7C6	3	
KPR	7E3	3	
LL	1489	3	
LLI	11G4	3	
LP	12D6	3	
LRP	10E8	3	
LRPR	10G7	3	
LS	13A/A7	9	
LSR	13A/B8	9	

DESIG	LOCATION FS	APP FIG	EQPT
RELAYS			
M	7G0	3	
MA	10B8	3	
MAR	10F8	3	
MDF	13A/D2	3	
MDFR	13A/B2	3	
MR	7E5	3	
NC	18E8	8	
NCI	18G2	8	
NC2	18F2	8	
NP	13B/F2	3	
NT	13A/F2	3	
NTI	15E2	7	
NT2	13A/E4	1	
NTR	13A/A2	3	
ON	1A/A3	3	
ONI	1A/B3	3	
ON2	1A/B3	3	
P	7C4	3	
PR	10D8	3	
PRR	10F7	3	
+R	11D1	3	
+NR	11G2	3	
-R	11C1	3	
-RR	11F1	3	
RC	11D3	3	
RCCI	7E0	3	
RCCIR	7D0	3	
RCRM	7D0	3	
REX	11H1	3	
REXI	11H4	3	
REXR	11H1	3	
REXS	11F5	3	
RG	11E2	3	
RGR	11F1	3	
RL	10B4	3	
ROH	12G2	3	
ROHI	12E9	3	
ROH2	12D8	3	
ROHD	12C7	1	
ROHR	12G2	3	
RT	11B/C1, 11G8	3	
RV	10E3	3	
RVM	10D8	3	
RVMR	10G7	3	
RVR	10F3	3	

DESIG	LOCATION FS	APP FIG	EQPT
RELAYS			
S	12B4	3	
S	12C4	3	
SL	13B/C2	3	
SO	1A/B1	1	
SRT	8D7	3	
SRTR	8G7	3	
ST	1B/D2	3	
STA	8F7	3	
STR	1B/H3	3	
+STA	8E7	3	
+STAR	8G8	3	
-STA	8F7	3	
-STAR	8G7	3	
+T	11D1	3	
-T	11B1	3	
TD	11B3	3	
TD	13A/B2	3	
TDR	13A/G2	3	
TF	18C8	8	
TFI	18G7	8	
TF2	18D8	8	
TFR	18C8	8	
TK	7G0	3	
TKM	7E8	3	
TKR	7F5	3	
TP	11B6, 11B/C5	3	
+TR	11G2	3	
-TR	11F1	3	
TRG	11C3	3	
TS	13A/C2	3	
TSI	15E2	7	
TS2	13A/D4	1	
TSR	13A/G2	3	
TT	13A/F2	3	
TTR	13A/H2	3	
VR	9D2	3	
VRR	9G2	3	
XN	12G3	3	

DESIG	LOCATION FS	APP FIG	EQPT
AMPLIFIERS			
AMP	1A/C3	1	
AMP1	17B4	7	
AMP2	17D4	7	
M	7C7	3	

DESIG	LOCATION FS	APP FIG	EQPT
BATTERIES			
B1	14F1, 14G1	4	
B2	14F1	4	
B3	14F3	5	

DESIG	LOCATION FS	APP FIG	EQPT
CAPACITORS			
C2	1A/D8	1	
C3	1A/D9	1	
C6	7C3	3	
C7	12B2	3	
C8	8D2	3	
C9	8D2	3	
C10	9B4	3	
C11	12C5	3	
C13	7D7	3	
C14	1A/G8	3	
C15	1B/B3	3	
C16	17D3	7	
C17	17D8	7	
C18	18F7	8	
C19	18C3	8	
C20	18C3	8	
C21	13B/D4	1	
C22	13B/C4	1	

DESIG	LOCATION FS	APP FIG	EQPT
DIODES			
CR1	2F1	1	
CR2	1A/C6	1	
CR3	1A/D6	1	
CR4	1A/D9	1	
CR5	4A8	1	
CR8	10E3	3	
CR9	7E2	3	
CR10	7E1	3	
CT	1B/G2	1	
CTR	1B/E2	1	
D1	7A9	3	
D2	11B3	3	
D3	7A8	7	
D4	7G8		
D5	16B3		
D6	8B2	3	
D7	8B2		
D8	8C2		
D9	8C2		
D15	16C2	7	
D15	1B/E2	3	
HR	15C6	7	
KP	7F9	3	
OR	1A/A3	3	
RT	11G6, 11B/C1	3	
SL	13B/C2	1	

FILTERS			
BRF	2A1	1	
CAF	3A1	1	
LPF	1A/C5	1	

FUSES			
+20	14G0	4	
+50	14G0	4	
+100	14F0	4	
+116	14F1	4	
-116	14F3	5	

ISSUE 20B

REMOTE TESTING CIRCUIT - FAR END

BELL TELEPHONE LABORATORIES INCORPORATED

2 SD-99311-01-A3

REV NO 6S

SD-99311-01-A3

P/O APPARATUS INDEX

DESIG	LOCATION FS	APP FIG	EQPT
INDUCTORS			
BR	10C5	3	
L	10D5	3	
OSC	1A/G4	1	
RT	8D1	3	

DESIG	LOCATION FS	APP FIG	EQPT
JACKS			
DS		3	
HYD	SEE	3	
HYL	APP	3	
KPI	FIG.	3	
TJI		3	

DESIG	LOCATION FS	APP FIG	EQPT
LAMPS			
B	10E1	3	
HR	15F7	7	
M	1A/F2	3	
N	9E4	3	
P	9E5	3	
RI	11C7, 11B/D7	3	
R2	11E7, 11B/C7	3	
RT	8E2	3	
S+	14F2	4	
S+	14F9	6	
S-	14F4	5	
S-	14F9	6	

DESIG	LOCATION FS	APP FIG	EQPT
NETWORKS			
Z1	5A4	2	

DESIG	LOCATION FS	APP FIG	EQPT
OSCILLATORS			
CCO	1A/C8	1	

DESIG	LOCATION FS	APP FIG	EQPT
PAD			
REC	2A0	1	

DESIG	LOCATION FS	APP FIG	EQPT
POTENTIOMETERS			
ADJ	232	1	
DTM	12C0	3	
H	1B/B9	3	
SENS	1A/D7	1	
SO	1A/F4	1	
ZERO	1A/D7	1	

DESIG	LOCATION FS	APP FIG	EQPT
RESISTORS			
HR	12C8	3	
HT	12C8	3	
RI	1A/C2	1	
R2	1A/D2	1	
R3	1A/C3	1	
R4	1A/D3	1	
R6	2E1	1	
R9	1A/B5	1	
R10	1A/D7	1	
R13	1A/E7	1	
R14	4A8	1	
R15	4B8	1	
R16	1A/C7	1	
R17	1A/B7	1	
R18	1A/B7	3	
R20	1A/B5	1	
R22	1A/F1	3	
R23	1B/C2,E7	3	
R24	7C1	3	
R25	12C0	3	
R26	1282	3	
R28	8C2	3	
R29	883	3	
R30	984	3	
R31	1A/B7	3	
R32	1A/B6	3	
R33	10B4	3	
R34	10D5	3	
R35	13B/F1	3	
R36	13B/F1	3	
R37	13B/C1	3	
R38	13B/G3	3	

DESIG	LOCATION FS	APP FIG	EQPT
RESISTORS			
R41	13B/C7	3	
R42	13B/E7	3	
R43	7D7	3	
R44	12D1	3	
R45	12D1	3	
R46	12E1	3	
R47	13B/E6	3	
R48	2E1	1	
R49	1183	3	
R50	1B/B3	3	
R60	5A9	1	
R61	5A6	1	
R62	5A4	3	
R63	11B/C4, 11F7	3	
R64	7A5	3	
R65	15B7	7	
R66	15C7	3	
R67	15B6	7	
R68	17F5	3	
R69	1583	7	
R70	15A8	7	
R71	1588	7	
R72	8B/C8	3	
R73	8F8	8	
RT	11B/C1	3	
RTI	11B/B1	3	

DESIG	LOCATION FS	APP FIG	EQPT
SELECTORS			
OD	SEE APP FIG.	7	

DESIG	LOCATION FS	APP FIG	EQPT
SWITCH			
SS	1A/E7	1	

DESIG	LOCATION FS	APP FIG	EQPT
TEST POINTS			
-22V	1A/E9	1	
-34V	2G0	1	

DESIG	LOCATION FS	APP FIG	EQPT
THERMISTOR			
TDR	1K93	7	

DESIG	LOCATION FS	APP FIG	EQPT
TRANSFORMERS			
T1	1A/F9	1	
T2	1A/C6	1	
T3	1A/C6	1	
T4	1B/B6	3	
T5	1B/B7	3	
T6	7C3	3	
T7	8D2	3	
T8	12C5	3	
T9	17C2	7	
T10	17C7	7	

DESIG	LOCATION FS	APP FIG	EQPT
TRANSISTORS			
Q1	2G1	1	

DESIG	LOCATION FS	APP FIG	EQPT
VARISTORS			
RV1	1B/A6	3	
RV2	1B/A6	3	

ISSUE 19AC

REMOTE TESTING CIRCUIT - FAR END (2)

SD-99311-01-A4

BELL TELEPHONE LABORATORIES INCORPORATED

SS

SD-99311-01-A4

LEAD INDEX

±130V POWER DISTRIBUTING CKT (ESS)

DESIG	LOCATION FS	LOCATION CAD
+130V	9F4, 13B/E8	401
-130V	9F4	461

COIN CONTROL SUPPLY

DESIG	LOCATION FS	LOCATION CAD
CC+	9F4	4F1
CC-	9F4	4G1

NO. 1 ESS SCANNER APPLIQUE CKT

DESIG	LOCATION FS	LOCATION CAD
NC	1BB9	1D7

FAR END TEST TRK OR LINE CKT

DESIG	LOCATION FS	LOCATION CAD
ANS	1B/DO	2FB
DIS	1B/DO	2AB
E	1A/FO, 18FO	4A3, 1D6
E(N)	1BFO	3FB
M	1A/FO, 1BFO	4A3
NC	1BB9	1D6
ON	1B/DO	4C3
ON1	1B/DO	4E3
R	1B/BO, 1BFO	4A3, 1G6
R1	1BFO	1G6,7C3
RS	1B/DO	1FO
T	1B/BO, 1BFO	4A3, 1G6
T1	1BFO	1G6,7C3

EXTENDED REM TST TRK CONT CKT

DESIG	LOCATION FS	LOCATION CAD
hR/RV	15E9	7D0
LL/XN	15E9	7D0
LC1	15C0	7D0
LG2	15C0	7D0
NT/MDF	15E9	7D0
R	15C0	7DC
S1	15E9	7D0
T	15C0	7D0
TS/LS	15E9	7D0
TT/D	15E9	7DC

FAR END TST TRK FOR INC REM TST FROM LTO

DESIG	LOCATION FS	LOCATION CAD
BY	1B/GO	4F3
CO	1A/E5	1A0
CO1	1A/E5	1C3
CT	1B/GO	1C3
CTG	1B/GO	1C3
CT1	1B/GO	1C3
DIS	1B/GO	1C3
E1	1A/EO	4F3
E(IN)	18FO	1E6
NC	1BA9	1E6
R	1B/BO, 18FO	1F6, 4A3
R1	18FO	1F6
R2	14C2	1FO
T	1B/BO, 1BFO	1F6, 4A3
T1	18FO	1F6
T2	14C2	1FO
TM	1B/CO	4F3

INCOMING TRK (NO-TEST)

DESIG	LOCATION FS	LOCATION CAD
G	13B/D8	5C1
LL	14B9	4C7
LLG	14B9	5E6
R	13B/D8	4C7,4D7, 5C1
S	13B/D8	4C7,4D7, 5C1
T	13B/D8	4C7,4D7, 5C1
XN	13B/G8	4D7

INCOMING TRK (NON-NO TEST)

DESIG	LOCATION FS	LOCATION CAD
G	13B/B8	5B1
LL	13B/B8	4B7
LLG	13B/B8	5E6
R	13B/B8	4A7,4B7, 5B1
S	13B/B8	4A7,4B7, 5B1
T	13B/B8	4A7,4B7, 5B1
XN	13B/G8	4A7

MDF TEST TRUNK CKT

DESIG	LOCATION FS	LOCATION CAD
G	13B/E8	5D1
R	13B/E8	4E7,5D1
S	13B/E8	4E7,5D1
T	13B/E8	4E7,5D1

MISC CKT FOR MISC INT FRAME

DESIG	LOCATION FS	LOCATION CAD
BT3	18CO	1D6
LBT	18CO	1D6
ST	18CO	3A5

TEST VOLTAGE POWER SUPPLY CKT OR REMOTE TEST VOLTAGE SUP CKT

DESIG	LOCATION FS	LOCATION CAD
20V	14F6	3C5
50V	14F6	3C5
100V	14F6	3C5
-116V	14FB	4E1
+116V	14FB	4E1
+GRO OR -GRD	14F6	3E5

RINGING SUPPLY

DESIG	LOCATION FS	LOCATION CAD
105V±	8EO	3G7
AC-DC	11A/D8, 11B/D7	3HO,3F5
AC-DC AUD		3F5
RING G		3H5
SUP +		3F5
SUP + AUD		
SUP -		
SUP - AUD		
RAC	11A/D8	3HO
RING G	8EO	3H7

RINGING & TONE CKT

DESIG	LOCATION FS	LOCATION CAD
R(LT 60)	1BAO	1C6
R(BT 60)	1BAO	1C6
T(LT 60)	1BAO	1C6
T(BT 60)	1BAO	1C6

TEST DISTRIBUTOR CONTROL

DESIG	LOCATION FS	LOCATION CAD
R	13B/B8	4B7
S	13B/B8	4B7
T	13B/B8	4B7

TST TRK 1ST SELECTOR (NO-TEST)

DESIG	LOCATION FS	LOCATION CAD
R	13B/D8	4C7
S	13B/D8	4C7
T	13B/D8	4C7

TST TRK 1ST SELECTOR (NON-NO TST)

DESIG	LOCATION FS	LOCATION CAD
R	13B/B8	4B7
S	13B/B8	4B7
T	13B/B8	4B7

TEST TRK & SELECTOR CKT

DESIG	LOCATION FS	LOCATION CAD
R	13B/GB	4F7
S	13B/G8	4F7
T	13B/G8	4F7

TIMER CKT

DESIG	LOCATION FS	LOCATION CAD
EC-	12CB	3B2
R-	12CB	3B2
ST-	12CB	3B2
T-	12CB	3B2

TONE DISTRIBUTING (ESS)

DESIG	LOCATION FS	LOCATION CAD
R (ROH)	12B9	3B2
R (LT60)	18AO	1C6
R (BT60)	18AO	1C6
T (ROH)	12B9	3B2
T (LT60)	18AO	1C6
T (BT60)	18AO	1C6

TOUCH-TONE FREQUENCY TEST APPLIQUE

DESIG	LOCATION FS	LOCATION CAD
R	13B/B8	4B7
R	13B/D8	4C7
S	13B/B8	4B7
S	13B/D8	4C7
T	13B/B8	4B7
T	13B/D8	4C7
TT1	13B/B8	3B0
TT2	13B/D8	3B0
LL	13B/B8	3D0
LL	14B9	3D0
LLG	13B/B8	3D0
LLG	14B9	3D0

TRANSMISSION FACILITIES

DESIG	LOCATION FS	LOCATION CAD
E	1A/FO, 1BFO	7A4
E(N)	1BFO	7C4
M	1A/FO, 1BFO	7A4
M(N)	1BFO	7C4
R	1B/BO, 1BFO	4A7,5A1 7A4
R1	1BFO	7C4
T	1B/BO, 1BFO	4A7,5A1 7A4
T1	1BFO	7C4

TONE SUPPLY (SXS)

DESIG	LOCATION FS	LOCATION CAD
BT2 60 IPM	1BBO	1D6
LT1 60 IPM BT	1BBO	1D6
LT4 60 IPM BR4	1BBO	1D6
LT5 60 IPM BR2	1BBO	1D6

VOICE OPERATED SWITCHED GAIN AMPL CKT

DESIG	LOCATION FS	LOCATION CAD
RA	7A2	3FO
RB	7A2	3FO
TA	7A1	3FO
TB	7A2	3FO

REMOTE TESTING MDF TEL AND LOUDSPEAKER CIRCUIT - FAR END

DESIG	LOCATION FS	LOCATION CAD
G	13B/F8	7B9
R	13B/FB	7A9
S	13B/FB	7A9
T	13B/F8	7A9

DESIG	LOCATION FS	LOCATION CAD

ISSUE 20B

REMOTE TESTING CIRCUIT - FAR END ②

SD-99311-01-A5

BELL TELEPHONE LABORATORIES INCORPORATED

6S

OPTION INDEX

APP OR WRG	RATED ON ISSUE	REFERENCE NOTES	LOCATION
5	STD 2A	111	APP FIG. 5
7	STD 15D		APP FIG. 7
8	STD 15D		APP FIG. 8, 1A/F1, 1B/A1, 1B/B2, 1B65
Z	STD 8AC MD 15D	313	1B/B4
Y	STD 2		9B3, 9B5, 9C3, 9C5, 9D4, 9D5
X	STD 2		9C3, 9C5, 9D4
W	STD 2	111	8E4, 8E5, 14F4, 14F5
V	STD 2	111	8E4, 8E5, 9E4
T	STD 6B		9E4, 9E5
S	STD 6B MD 15D		APP FIG 3, 12C7, 13B/C6,
R	STD 6B MD15D		APP FIG 3, 12C7, 13B/C6, 13E/C7, 13B/E7, 15B/F7
Q	STD 8C MD15D	313	APP FIG 3, 1B/B4, 1B/C4
N	STD 9B		APP FIG. 3, 7C2, 11H4, 11F3, 14B8
M	STD 9B MD15D		1A/H8, 7C2, 11C4, 11C7, 7B9
K	MD8AC		1B/B4
J	STD 10B	105	9A5
H	STD 10B	105	APP FIG 3, 9A5
G	STD 10B		APP FIG. 1, 1A/E9
F	MP 10B		APP FIG. 3, 1A/B5, 1A/C8, 7B4, 7C4, 7D1, 7G9, 10B2, 10D2
E	STD 10B	106	APP FIG. 3, 1A/B5, 1A/C8, 7C4, 7D1, 7D2, 7G9, 10B2, 10D2, 10E5
B	MD10B		APP FIG. 3, 11C2, 11D2, 11E2, 11F1, 11F2, 11G1
A	STD10B	106, 107	11C2, 11D2, 11E2, 11F1, 11G1
ZA	MD 10B		14A5 14B5, 14A2, 14B1
ZB	STD 10B		14A3, 14B5, 14A2, 14B1
ZC	MD 11B		APP FIG. 1
ZD	STD 11B		APP FIG. 1
ZE	MD 10B		13A/B1
ZF	STD 10B		13A/B1

APP OR WRG	RATED ON ISSUE	REFERENCE NOTES	LOCATION
ZG	A&M10B		APP FIG 1
ZH	STD 10B		APP FIG. 1
ZJ	STD 12B	109	APP FIG 3, 7A8, 11A/B4, 13B/D7, 14B8
	STD 12B MD 19AC	109	APP FIG. 3, 7A8, 11A/B4, 13B/D7, 14B8
ZK	MD 12B		11H2, 11H3, 11H4
ZL	STD 12B		11H2, 11H3, 11H4, 11H5
ZM	STD 12B	110	11E8
ZN	STD 12B MD 19AC	108	11E8
ZD	STD 15D		1A/E6, 14A2, 14B2,
ZP	STD 15D		APP FIG. 1, 3, 1A/E1,
ZQ	STD 15D	111	APP FIG 3, 7H1, 7F8, 8D5, 12E0, 13A/C2, 13A/E2, 13B/E1, 13B/C2, 14A-B4, SHEETS 15, 16, 17E2, 17E4, 17B5, 17D5, 17E7
ZR	STD 15D		7H1, 7B8, 7F8, 7G8, 13B/E1, 13B/C2, 14A-B4
ZS	STD 15D		APP FIG 3, 11H4, 14B8
ZT	STD 15D		7C2
ZU	STD 15D		1A/H8, 7B9, 11C4, 11C7
ZV	MD 15D		APP FIG 3, 7F8
ZW	STD 15D		APP FIG 3, 7F8
ZX	STD 15D		7A8
ZY	STD 15D		APP FIG 3, 7A5, 7A8
ZZ	MD15D	112	APP FIG 3
YA	STD 15D	112	APP FIG 3
YB	STD 15D		1A/E1, 1A/F1, 1B/A1, 1B/B1, 1B/B5, 1B/C5, 1B/C9
YC	STD 15D		1A/F1, 1A/C5, 1B63, 1BC7, 1BG1, 1BH2, 1A64, 1B/B9
YD	STD 15D	313	1BC1, 1BB4
YE	STD 15D	313	APP FIG 8, 1B93
YF	MD15D		1B/B8, APP FIG 3
YG	STD 15D	313	APP FIG 3
YH	STD 15D	312	1B/B4, 1B/C8
YI	STD 15D	312	1B/B5, 1B/B8
YJ	STD 15D	312	1B/B5, 1B/C5, 1B/C8
YK	STD 15D	313	APP FIG 8
YL	STD 15D	313	APP FIG 8
YM	STD 15D	313	APP FIG 8
YN	MD 15D		APP FIG 3, 8C1, 8C2
YD	STD 15D		APP FIG 3
YP	STD 15D		8B0, 8A2, 8C2
YQ	STD 15D		APP FIG 3, 12B7, 13C7, 13B/C8, 13B/C7, 13B/E7, 15B/F7
YR	STD 15D		APP FIG 3, 13B/C6
YS	STD 16D		APP FIG 9
YT	STD 15D		13B/A4, 13B/B4, 13B/C4

APP OR WRG	RATED ON ISSUE	REFERENCE NOTES	LOCATION
YU	STD 16D		13A/G5
YV	STD 16D		APP FIG. 1
YW	STD 17B	114	8B2, 8C3
YX	STD 17B	114	APP FIG. 3 8C2, 8C3
YY	MD 18B	115	APP FIG. 1, 7C3, 7D3, 10C5, 12B1, 12B3, 13B/C0, 13B/C1, 13B/D0, 13B/E1, 16D7
YZ	STD 18B MD 19AC	115	10C5, 10B6, 12A3, 12B1, 12H3, 13B/C1, 13B/D1, 13B/E1, 16D7
XA	MD 19AC	116	1A/E6, 7B6, 7C1, 7D6, 7E9
XE	STD 19AC	116	1A/E6, 7B1, 8B6, C1, C3, D6, 10B4-6, C5, 12A3, 12B1, 12H7, 13B/C1, 13B/D1, 13B/E1, 16D7
XC	MD 19AC		1B/F1
XD	STD 19AC		1A/B4, 1B/F1
XE	MD 19AC		7C9, 15B2, 16E8, 17B4, 17D5, 15CC
XF	STD 19AC		APP FIG 3(C5), 15B2.6, 16D8, 17B4, 17D5
XG	MD 19AC		18E7
XH	STD 19AC		16E8
XI	STD 19AC		APP FIG 3, 11A/A5, B4, E6, C4, D3
XJ	STD 19AC		APP FIG. 3, 7A6, 8, 11A/A4, A5, B4, B6, D3, SH 11B, 13B/D7, 14B8
XK	STD 19AC		13B/F8
XL	STD 19AC		13B/F8
XM	STD 20B		APP FIG. 1, 2, 3, 7, 8, 9

ISSUE 20B

REMOTE TESTING CIRCUIT-FAR END

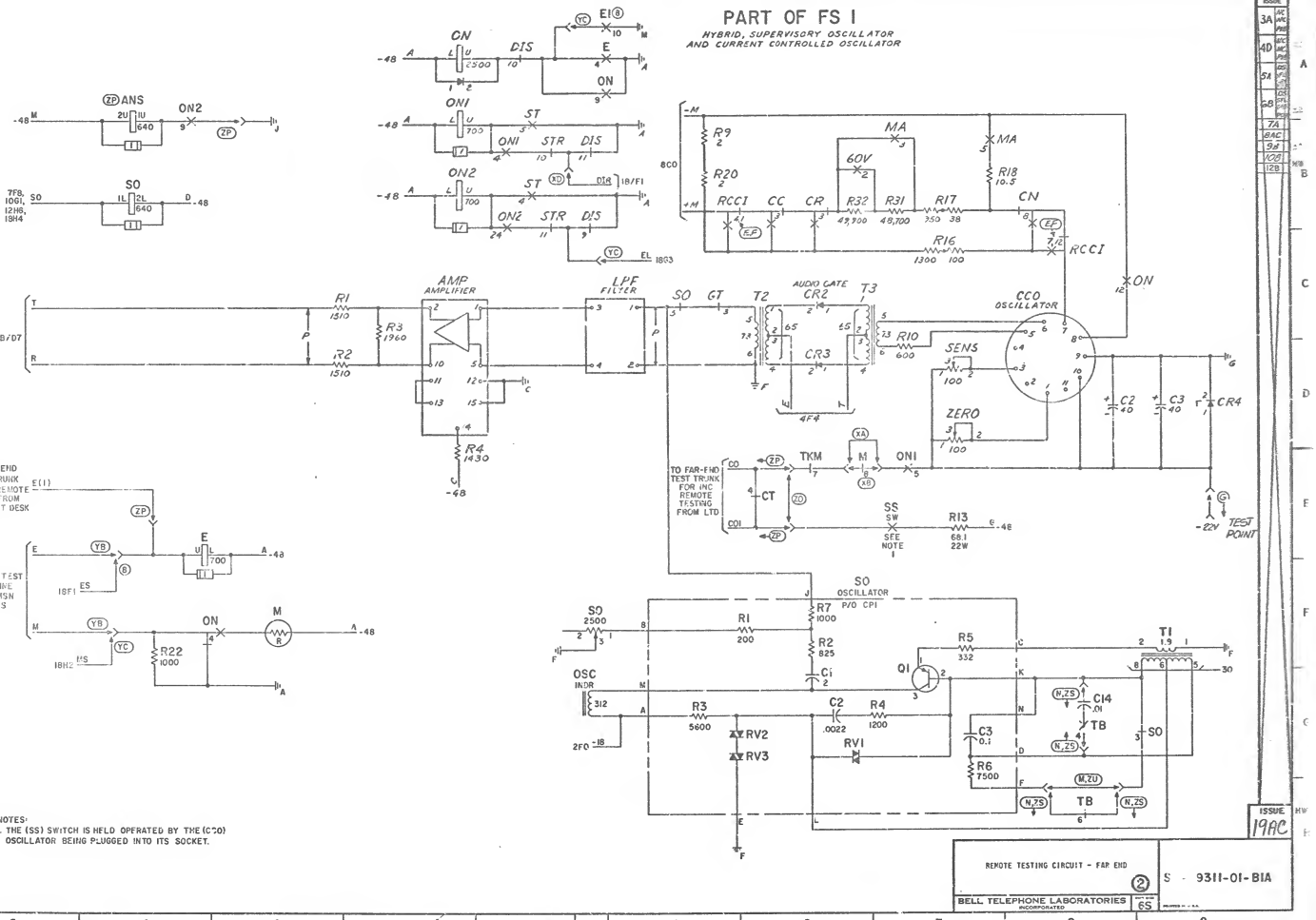
SD-99311-01-A6

BELL TELEPHONE LABORATORIES INCORPORATED

FORM 6S

PART OF FS I

HYBRID, SUPERVISORY OSCILLATOR AND CURRENT CONTROLLED OSCILLATOR



NOTES:
1. THE (SS) SWITCH IS HELD OPERATED BY THE (CCO) OSCILLATOR BEING PLUGGED INTO ITS SOCKET.

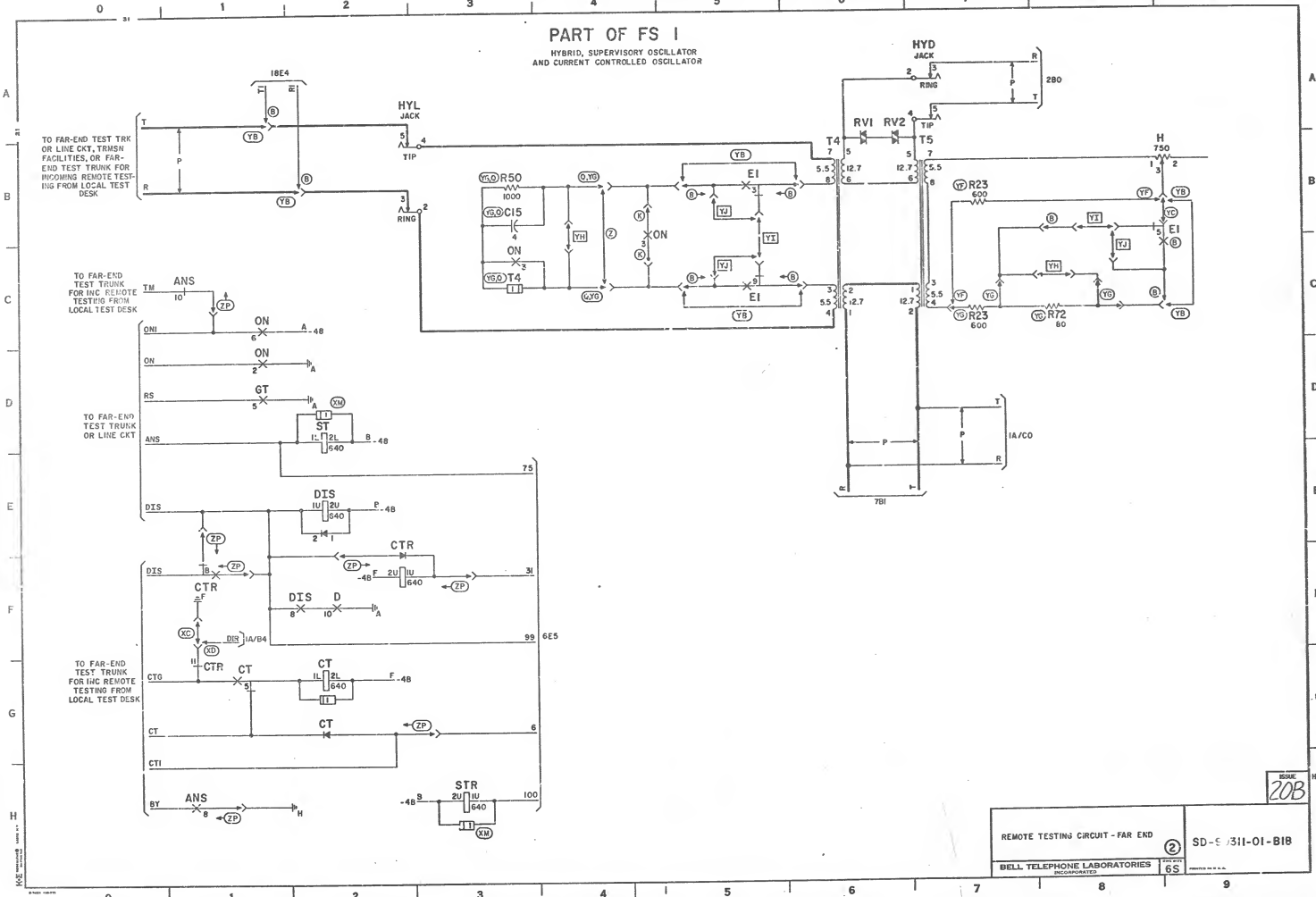
REMOTE TESTING CIRCUIT - FAR END

BELL TELEPHONE LABORATORIES INCORPORATED

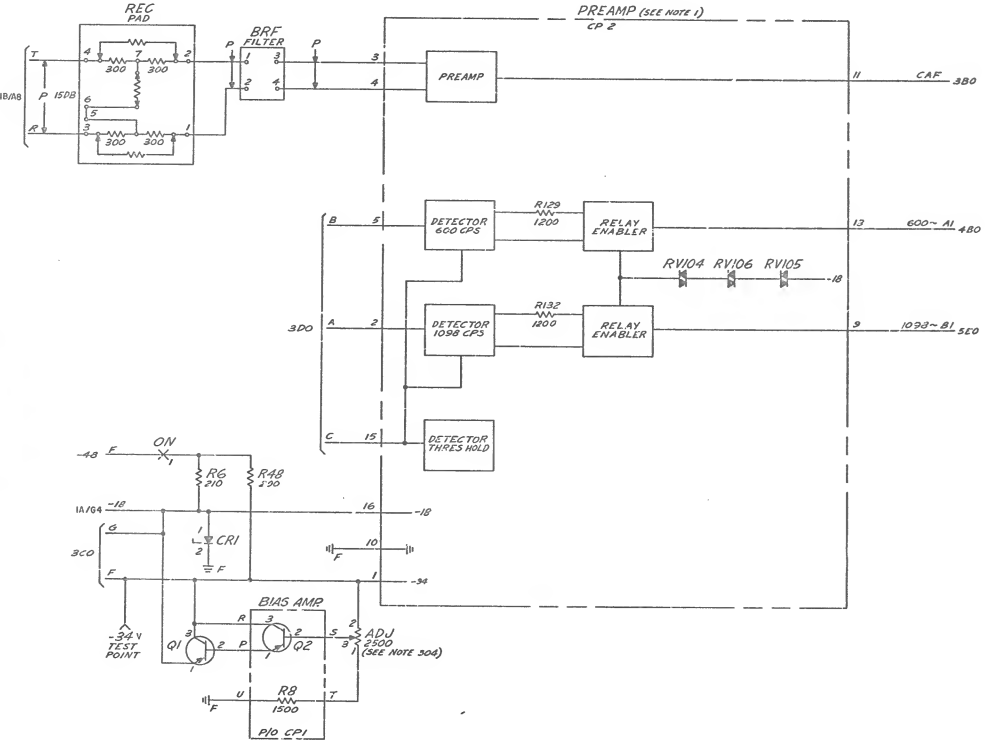
S - 9311-01-BIA

ISSUE 19AC

SD-93111-01-BIA


PART OF FS I
HYBRID, SUPERVISORY OSCILLATOR AND CURRENT CONTROLLED OSCILLATOR
HYD JACK
HYL JACK
18E4
TO FAR-END TEST TRK OR LINE CKT, TRMSN FACILITIES, OR FAR-END TEST TRUNK FOR INCOMING REMOTE TESTING FROM LOCAL TEST DESK
TIP
RING
RV1
RV2
T4
T5
H
750
R50
1000
C15
ON
R23
600
R72
80
E1
TO FAR-END TEST TRUNK FOR INC REMOTE TESTING FROM LOCAL TEST DESK
ANS
TO FAR-END TEST TRUNK OR LINE CKT
GT
ST
DIS
CTR
CT
STR
IA/CO
TO FAR-END TEST TRUNK FOR INC REMOTE TESTING FROM LOCAL TEST DESK
REMOTE TESTING CIRCUIT - FAR END
BELL TELEPHONE LABORATORIES INCORPORATED
SD-93311-01-B18
ISSUE 20B
SD-93311-01-B18

FS 2
MULTITONE PREAMPLIFIER



SHEET NOTES:

1. SEE EQUIPMENT NOTE 202 BEFORE REPLACING CP2.

ISSUE 1 7B

REMOTE TESTING CIRCUIT-FAR END

SD-99311-01-82

BELL TELEPHONE LABORATORIES INCORPORATED

SD-99311-01-82

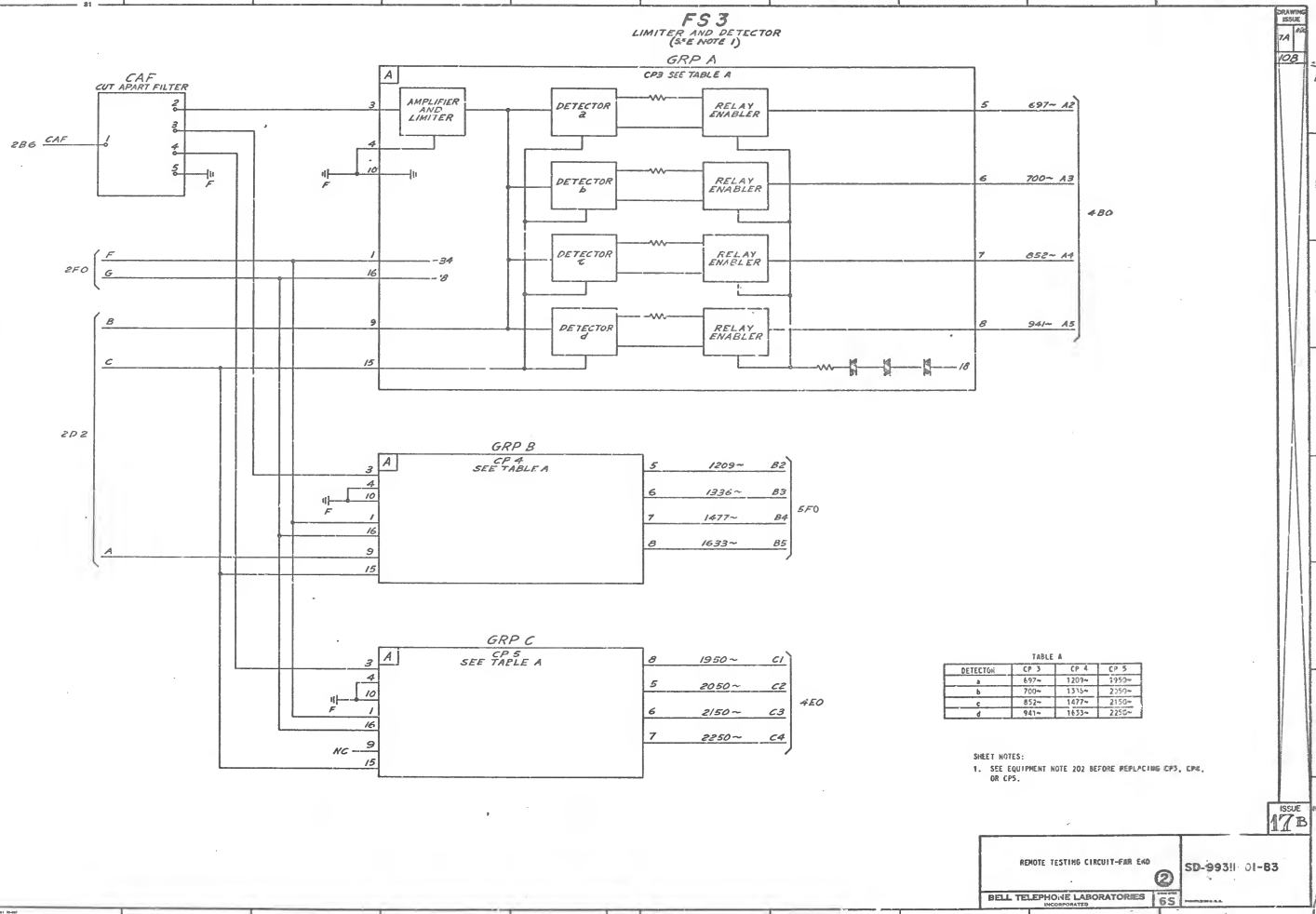


TABLE A

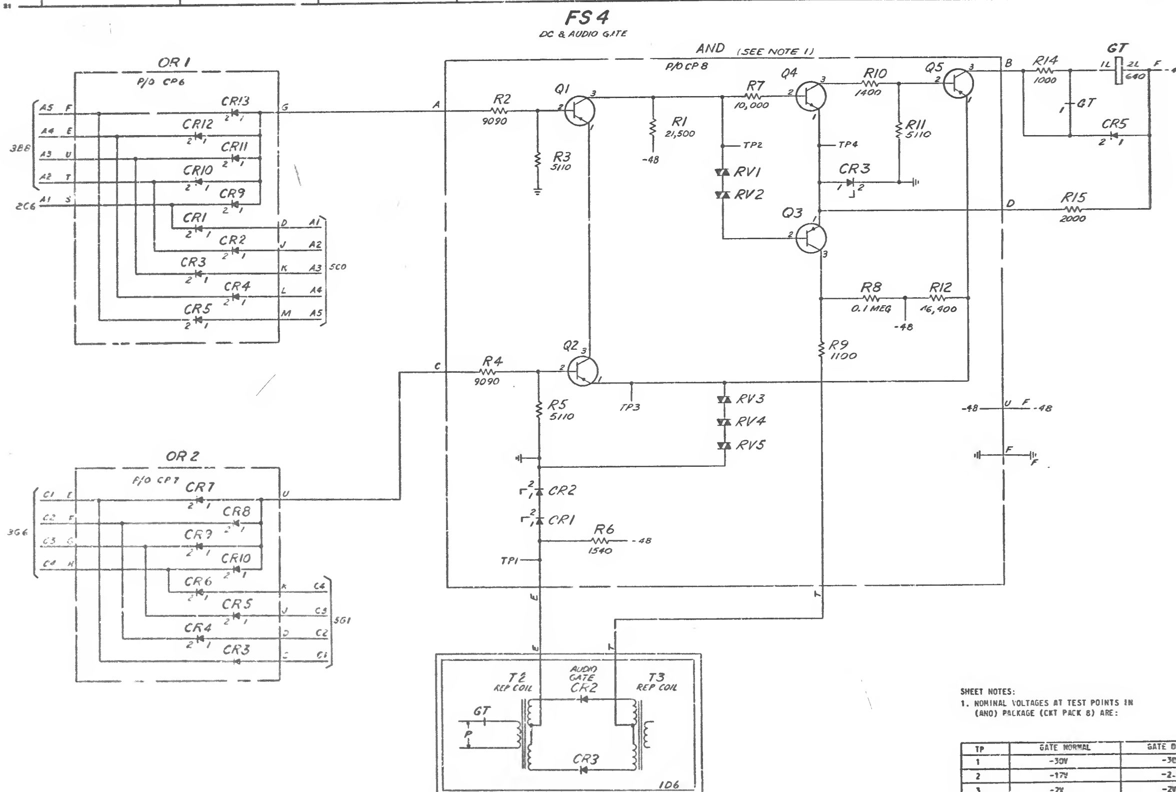
DETECTOR	CP 3	CP 4	CP 5
a	697~	1209~	1950~
b	700~	1336~	2050~
c	852~	1477~	2150~
d	941~	1633~	2250~

SHEET NOTES:
1. SEE EQUIPMENT NOTE 202 BEFORE REPLACING CP3, CP4, OR CP5.

DRAWING ISSUE 17 AR
108
ISSUE 17 B

REMOTE TESTING CIRCUIT-FAR E4D
BELL TELEPHONE LABORATORIES INCORPORATED
SD-99311-01-83
2
65

SD-99311-01-83



SHEET NOTES:

1. NOMINAL VOLTAGES AT TEST POINTS IN (AND) PACKAGE (CKT PACK 8) ARE:

TP	GATE NORMAL	GATE OPERATED
1	-30V	-30V
2	-17V	-2.5V
3	-2V	-2V
4	-15V	-15V
TERM. T	-29V	-48V

10

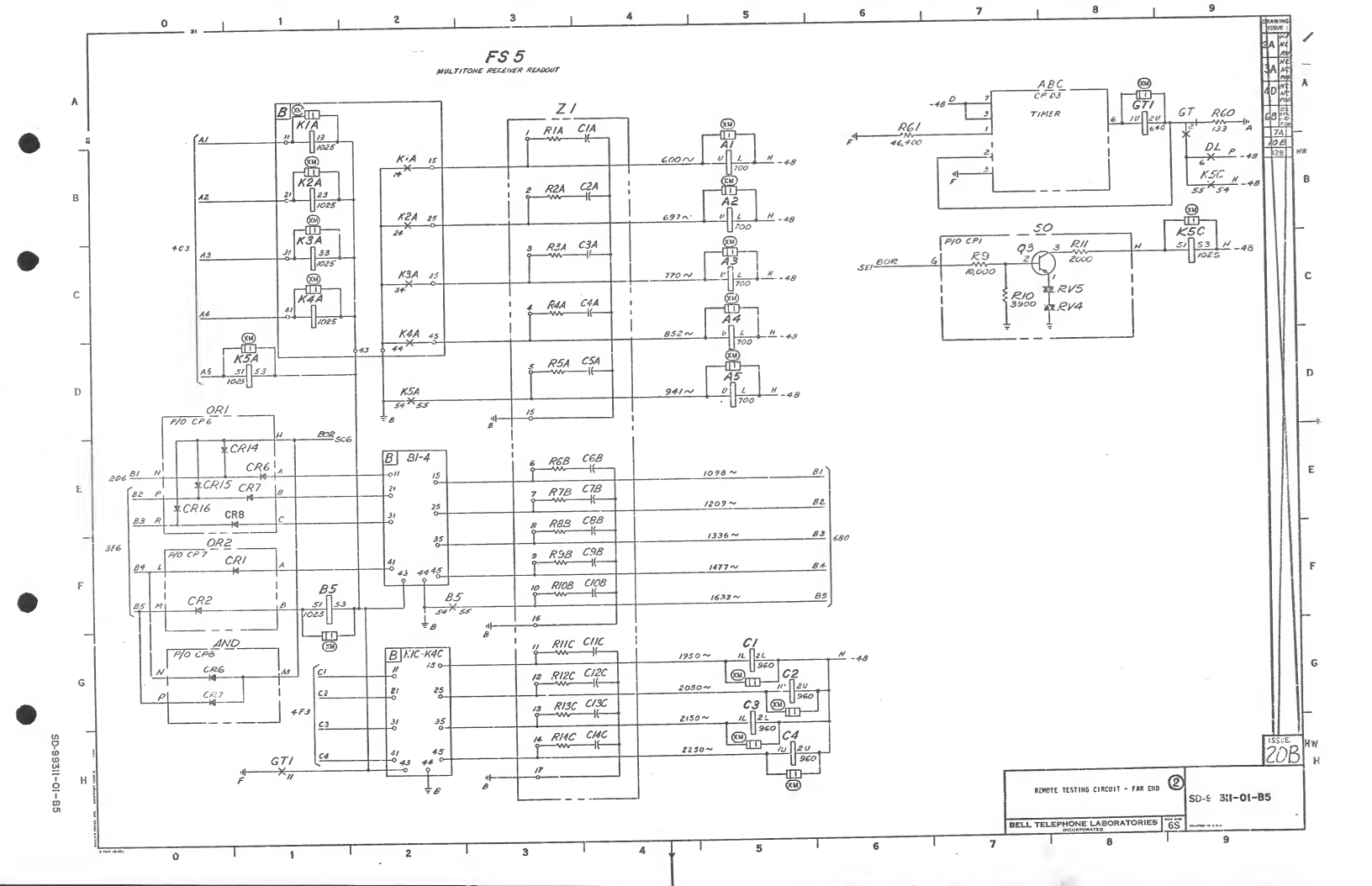
REMOTE TESTING CIRCUIT - FAR END ②

SD-99311-01-B4

BELL TELEPHONE LABORATORIES INCORPORATED

6S

SD-99311-01-B4


FS 5
MULTITONE RECEIVER READOUT
Z1
ABC
CP D3
TIMER
SO
OR1
OR2
AND
B5
B1-4
K1C-K4C
GT1
C1
C2
C3
C4
REMOTE TESTING CIRCUIT - FAR END
SD-93311-01-85
BELL TELEPHONE LABORATORIES
INCORPORATED
ISSUE 20B

FS 6

MULTITONE TRANSLATOR

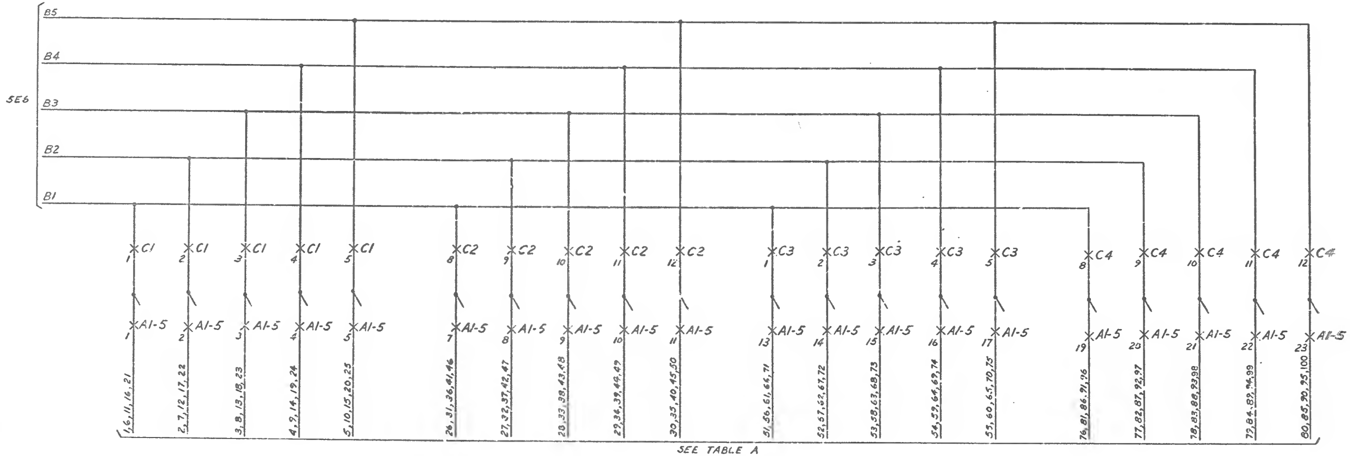


TABLE A

RELAY	LEAD	LOC	LEAD	LOC	LEAD	LOC	LEAD	LOC
A1	1		26		51	13A/F1	76	13A/A1
	2	13A/B1	27	13A/G1	52	13A/F1	77	13A/G1
	3		28		53	8D8	78	8G8
	4	13A/C1	29	13A/G1	54	11D1	79	11G1
	5	12F1	30		55	11D1	80	11G1
A2	6	1B/G4	31	1B/F4	56		81	
	7	11E1	32	11F1	57	9E1	82	9H1
	8	12G1	33	12G1	58	9F1	83	9H1
	9	9C1	34	9G1	59	8E8	84	8G8
	10	10B8	35	10F8	60	8F8	85	8G8
A3	11	10C8	36	10F8	61		86	
	12	13A/D1	37	13A/B1	62		87	
	13	13A/E1	38	13A/A1	63		88	
	14		39		64	18C6	89	18C6
	15	9D1	40	9G1	65		90	
A4	16	11B1	41	11F1	66	11H1	91	11H1
	17	11C1	42	11G1	67		92	
	18		43		68	13A/A8	93	13A/B8
	19	7G6	44	7G6	69	16B1	94	16B1
	20		45		70		95	
A5	21	7G2	46	7E6	71	7F2	96	7D2
	22	10D8	47	10G8	72	10D8	97	10G8
	23	13A/C1	48	13A/G1	73	10E8	98	10G8
	24	7H2	49	7E6	74		99	16B1, 13/F4
	25	7H2	50	7F6	75	1B/E4	100	1B/H4

DRAWING ISSUE: 3A, 4D, 7A, 9B

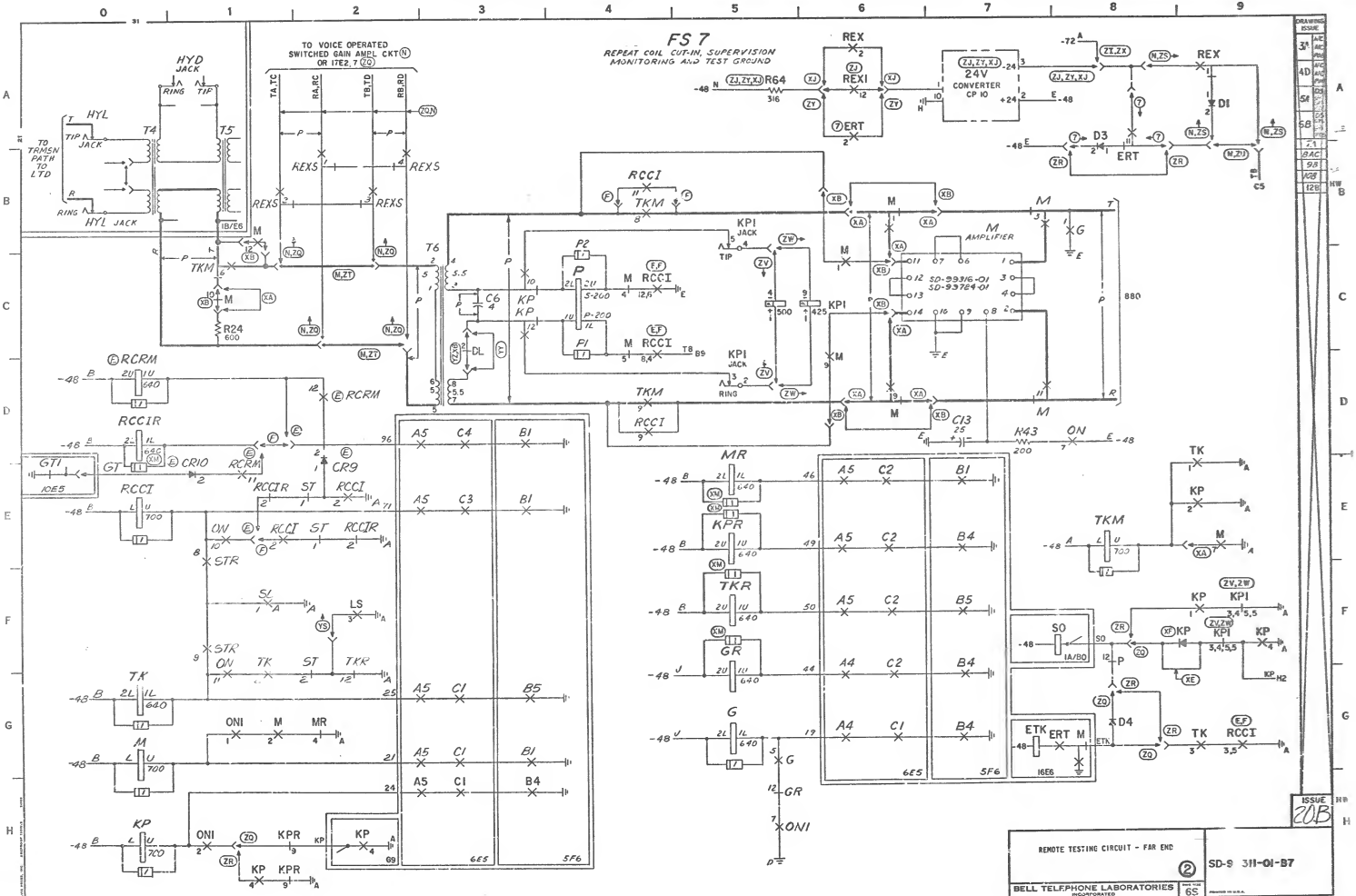
ISSUE 17B

REMOTE TESTING CIRCUIT - FAR END ②

SD-99311-01-B6

BELL TELEPHONE LABORATORIES INCORPORATED

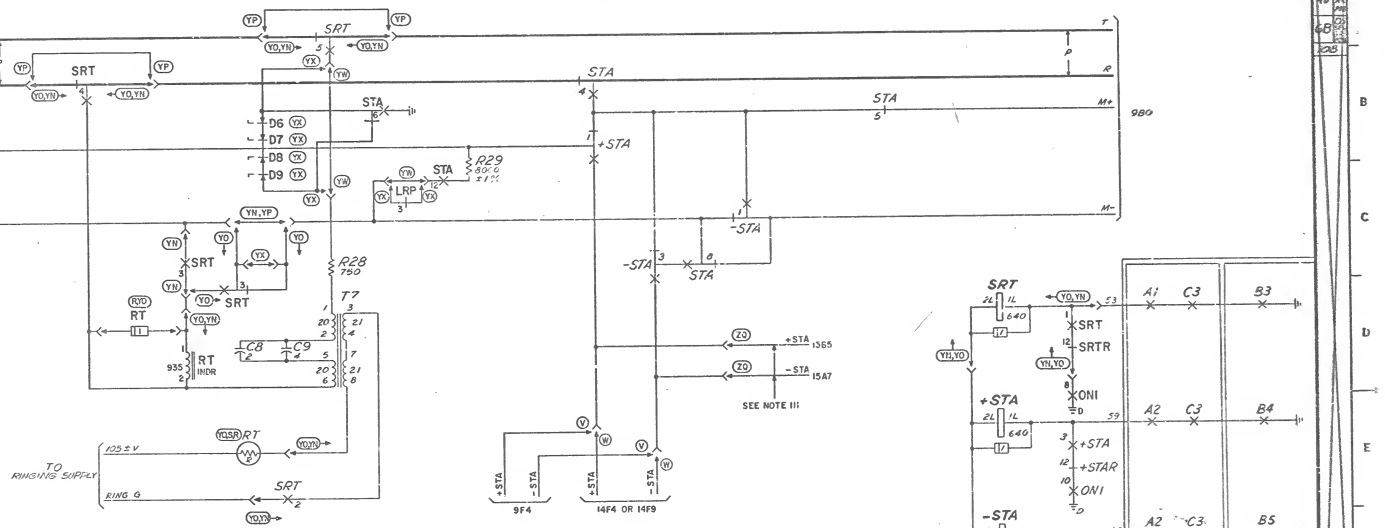
6S



SD-99311-01-87

FS 8

SUBSCRIBER RELAY TEST & STATION RINGER TEST

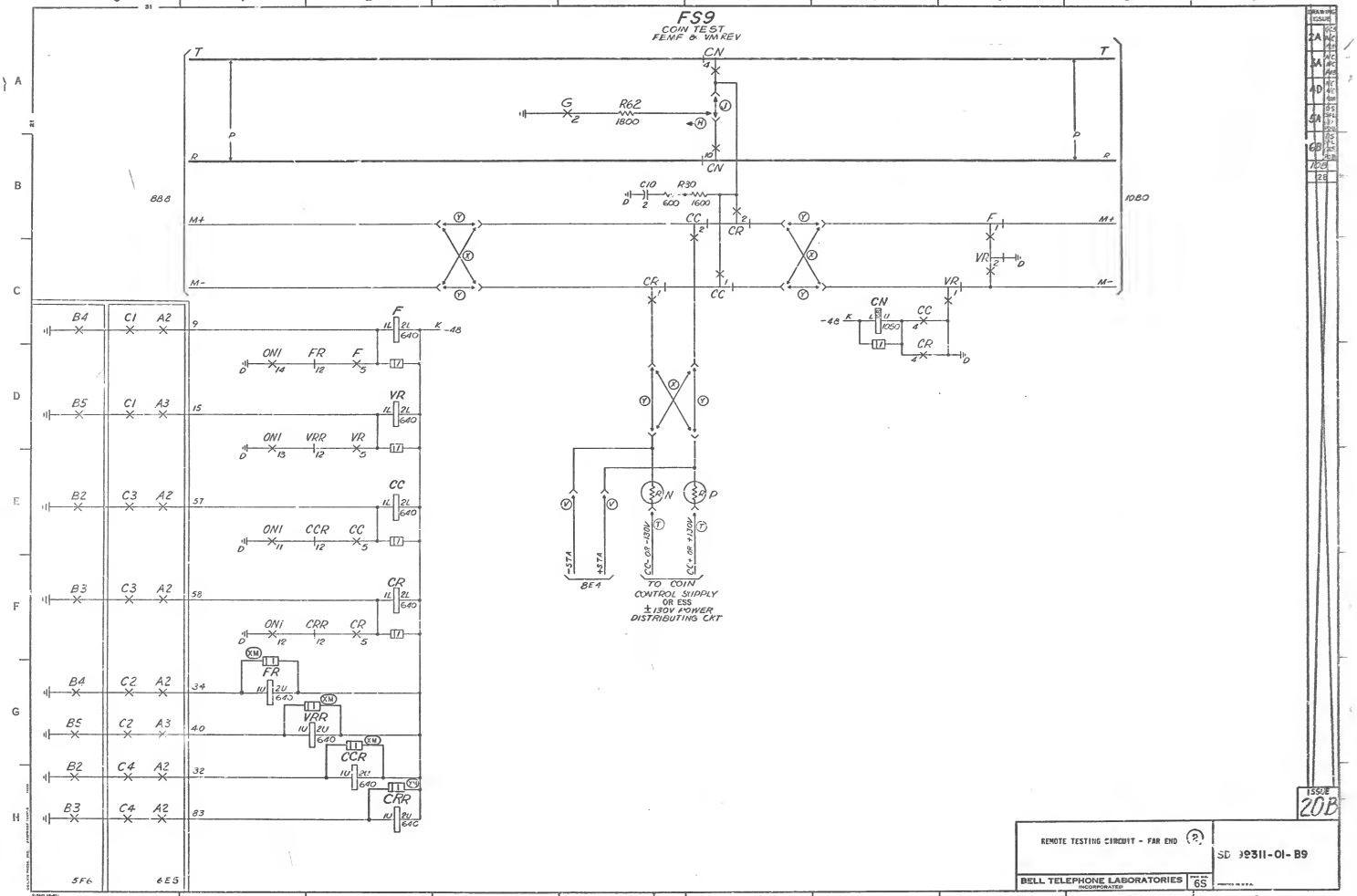


REMOTE TESTING CIRCUIT - FAR END

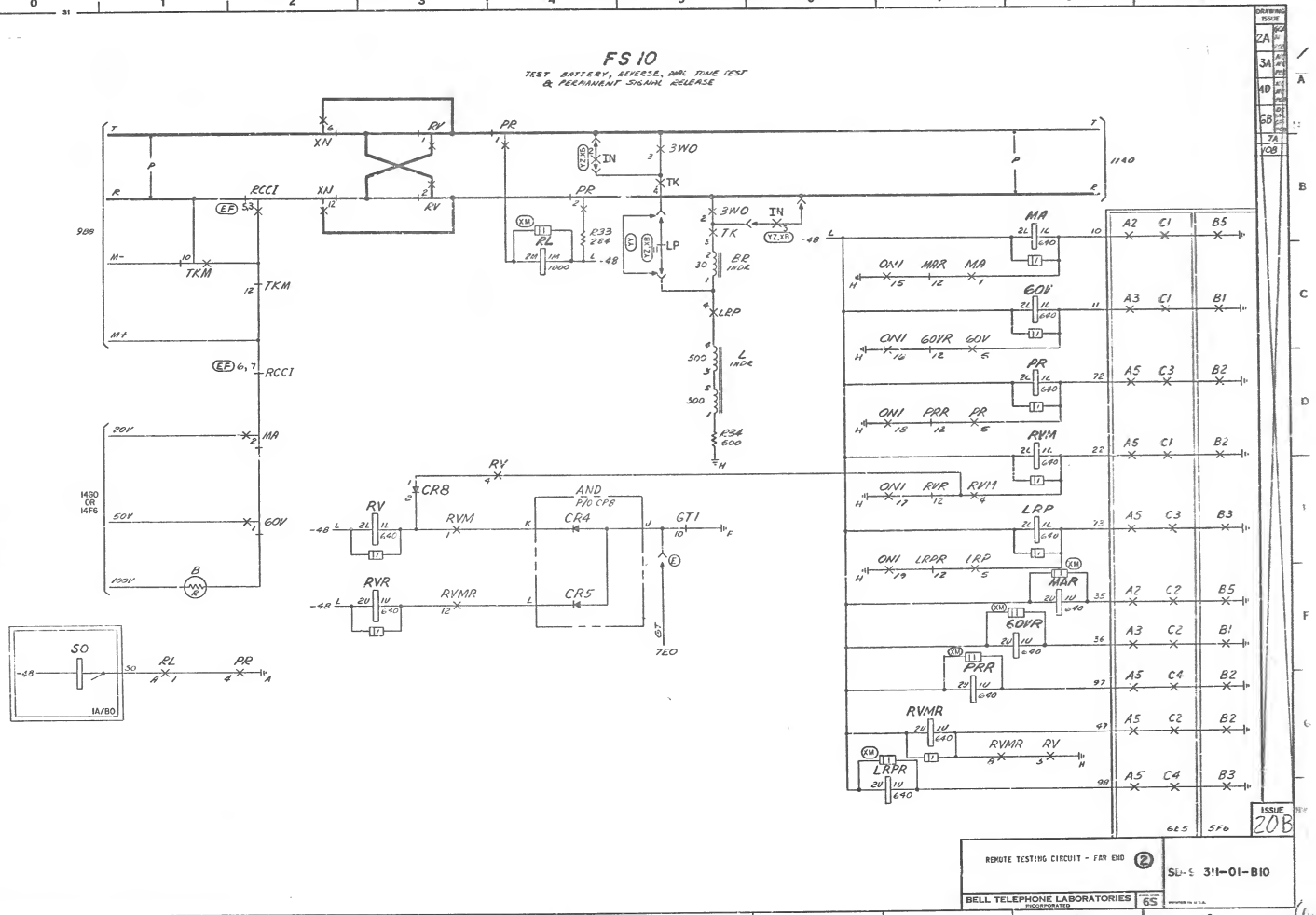
SD-99311-01-B8

BELL TELEPHONE LABORATORIES INCORPORATED

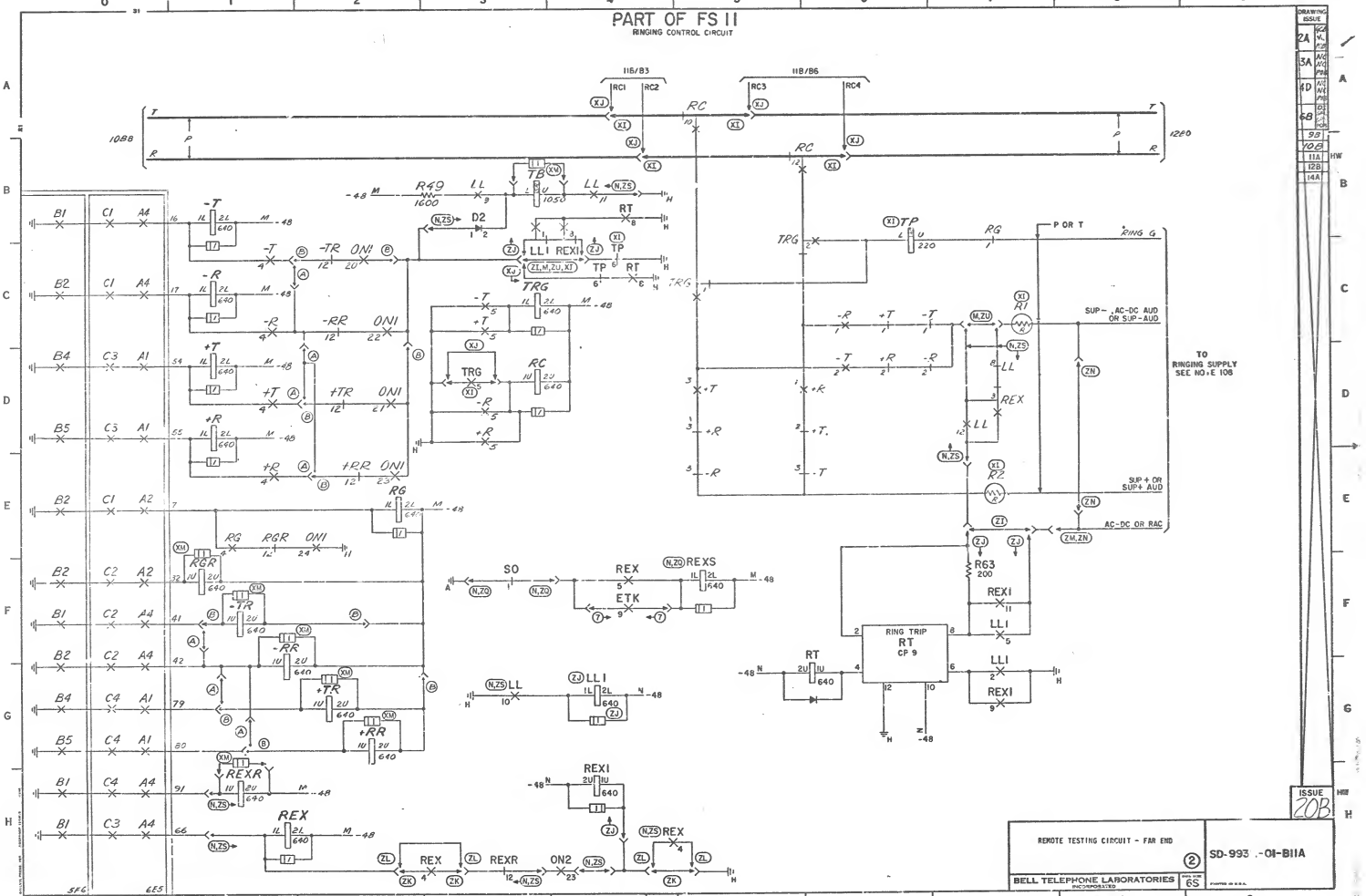
ISSUE 20B



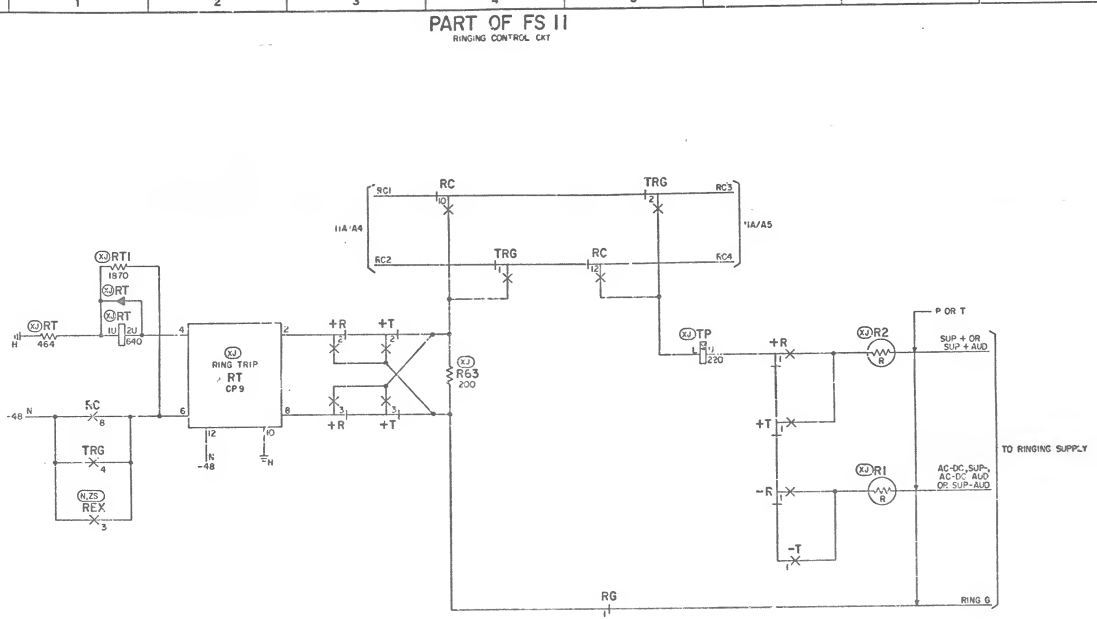
SD-99311-01-B-9



SD-99311-01-810

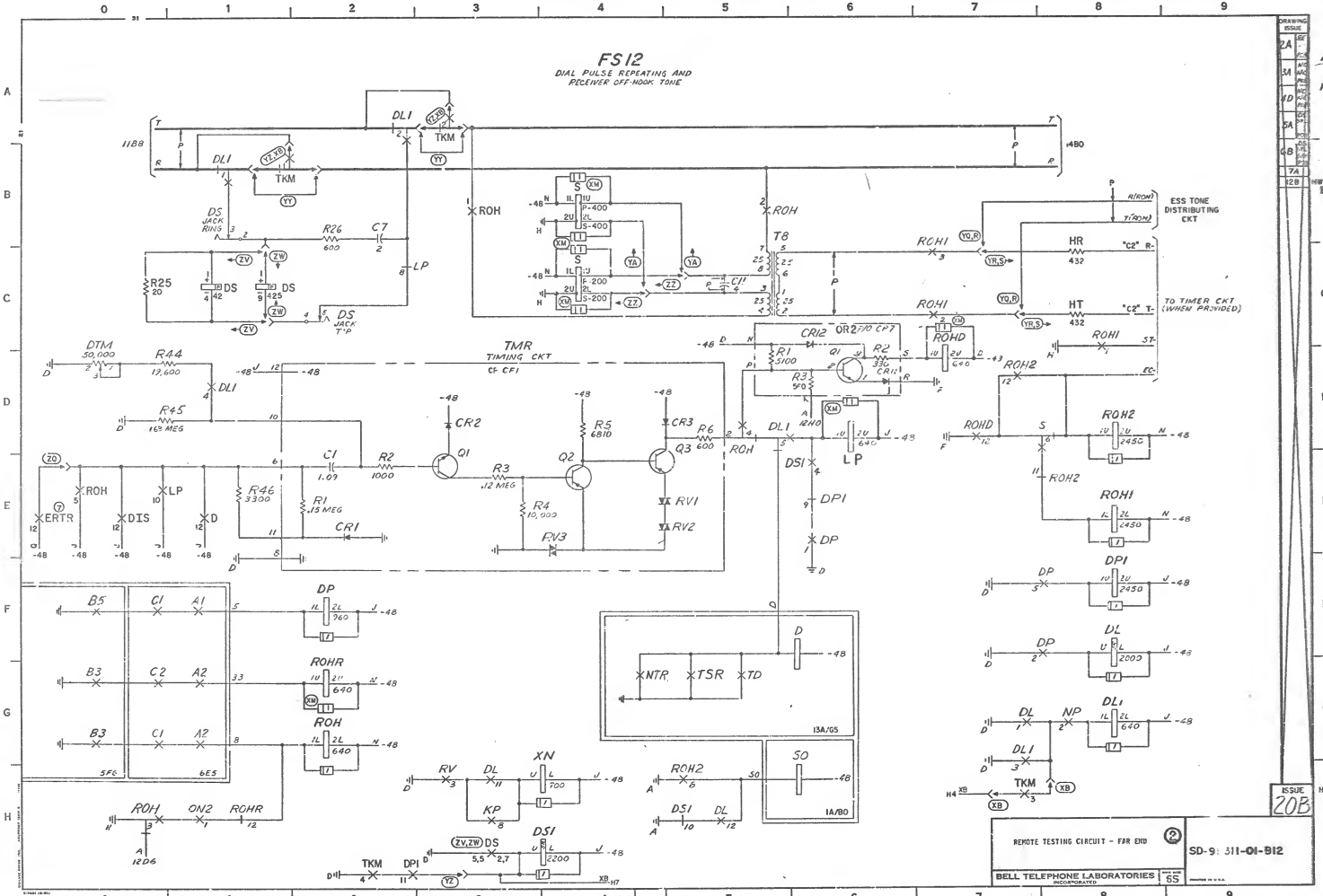


SD-993II-01-BIIA

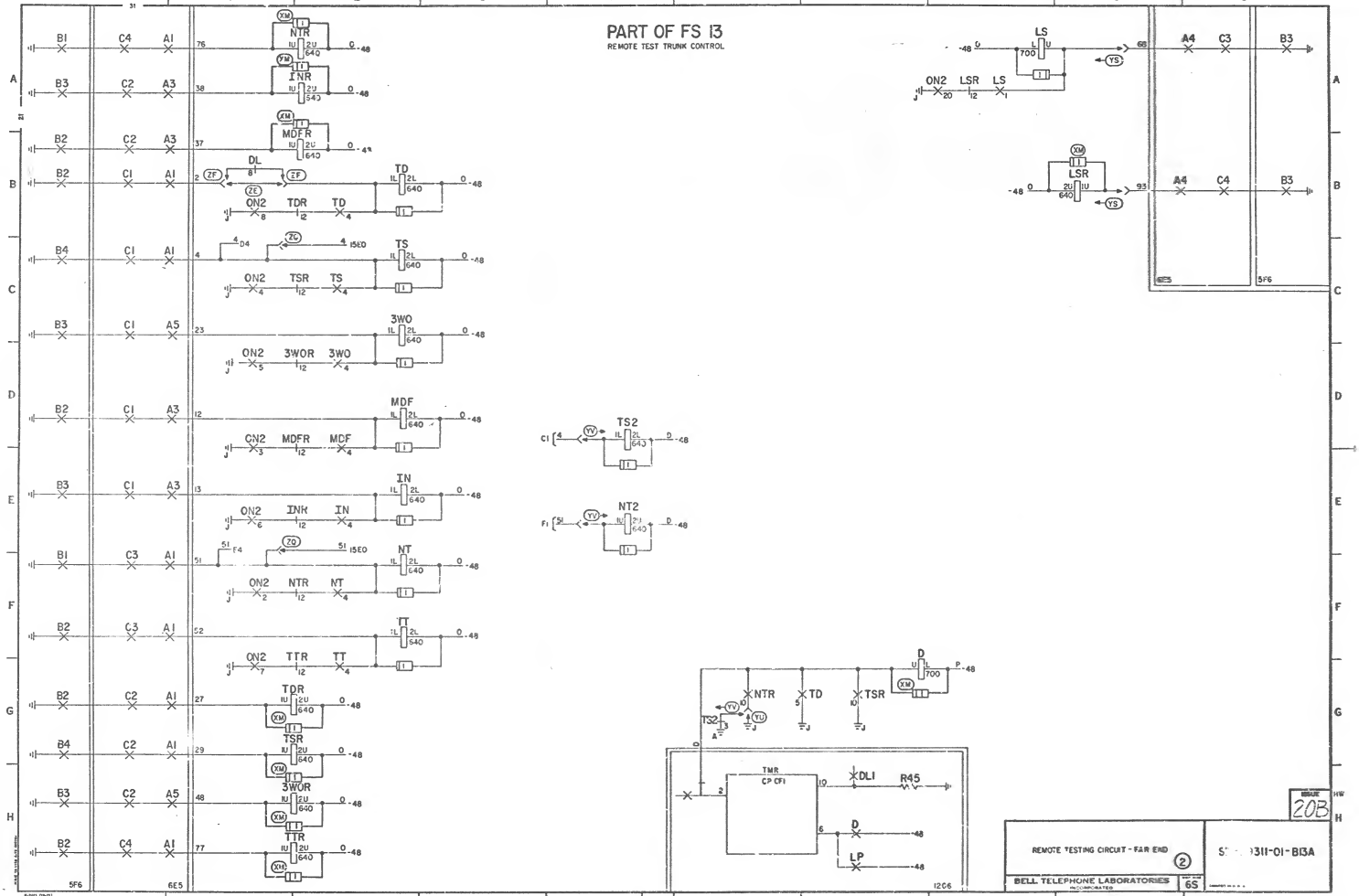


ISSUE 19AC

REMOTE TESTING CIRCUIT - FAR END (2)	SD-95 1-01-B11B
BELL TELEPHONE LABORATORIES INCORPORATED	65

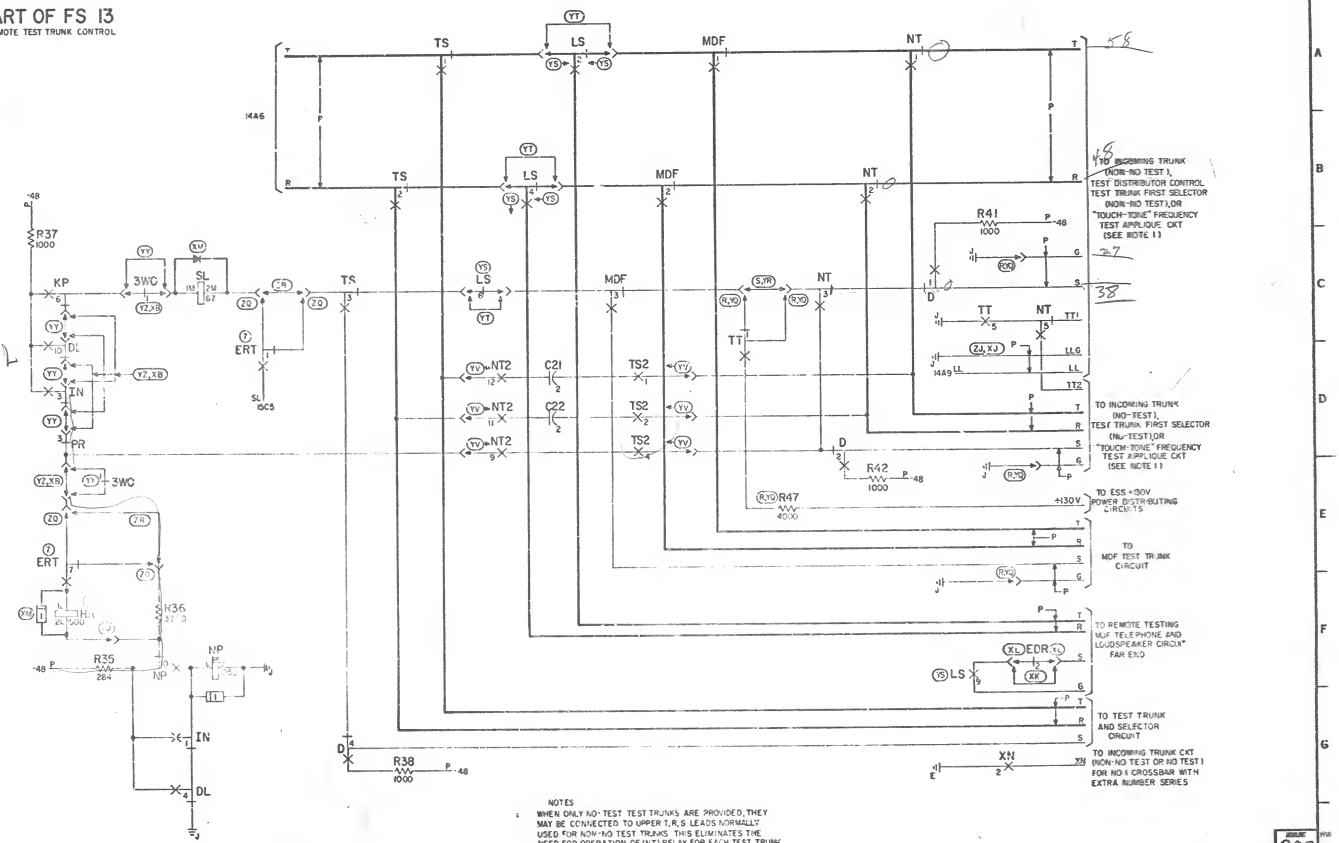


SD-99311-01-B12


PART OF FS 13
REMOTE TEST TRUNK CONTROL
NTR
INR
MDFR
DL
TD
TS
3WO
MDF
IN
NT
TT
TDR
TSR
3WOR
TTR
TS2
NT2
LS
LSR
TMR
CP CFI
DLI
R45
LP
REMOTE TESTING CIRCUIT - FAR END
BELL TELEPHONE LABORATORIES
SD-99311-01-BI3A

PART OF FS 13

REMOTE TEST TRUNK CONTROL



NOTES

WHEN ONLY NO-TEST TEST TRUNKS ARE PROVIDED, THEY MAY BE CONNECTED TO UPPER T, R, S LEADS NORMALLY USED FOR NON-NO TEST TRUNKS. THIS ELIMINATES THE NEED FOR OPERATION OF (NT) RELAY FOR EACH TEST TRUNK OPERATION.

ISSUE 20B

REMOTE TESTING CIRCUIT - FAR END (2)

SD 9311-01-8138

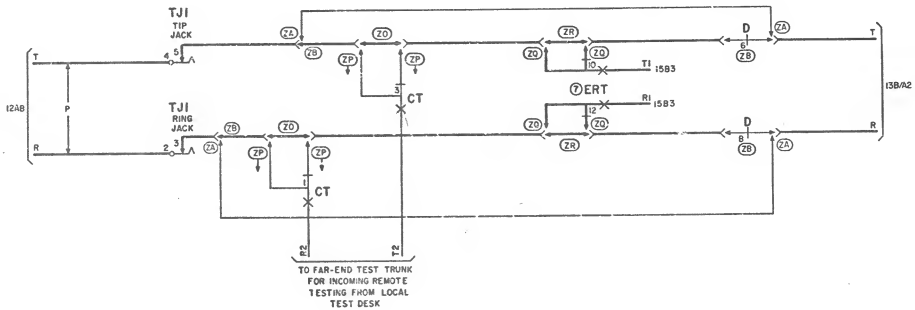
BELL TELEPHONE LABORATORIES INCORPORATED

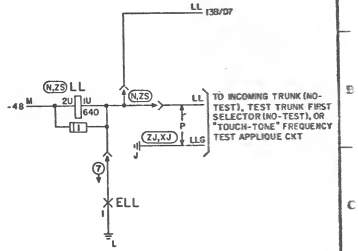
6S

SD-9311-01-8138

PART OF FS 13

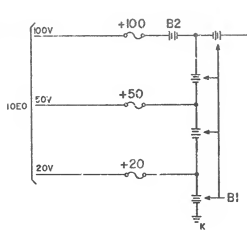
REMOTE TEST TRUNK CONTROL





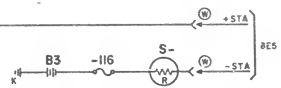
④FS 14

POSITIVE TEST BATTERY
SEE NOTE 302



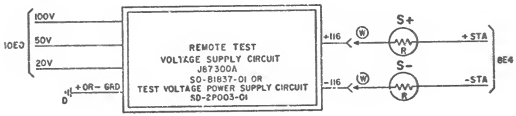
⑤FS 15

NEGATIVE TEST BATTERY
SEE NOTE 302



⑥FS 16

POWER SUPPLY



ISSUE 20B

REMOTE TESTING CIRCUIT - FAR END

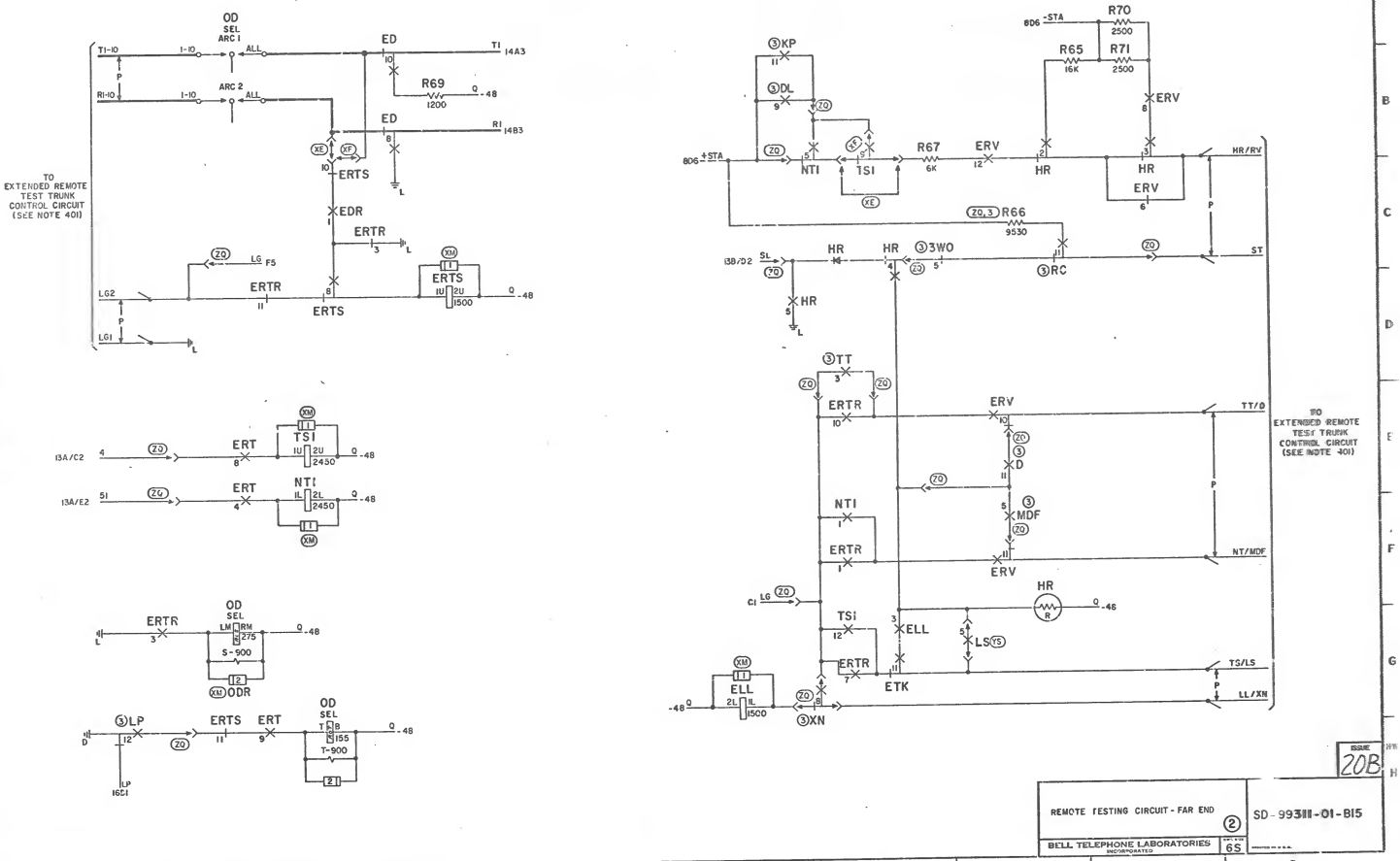
SD 99311-01-B14

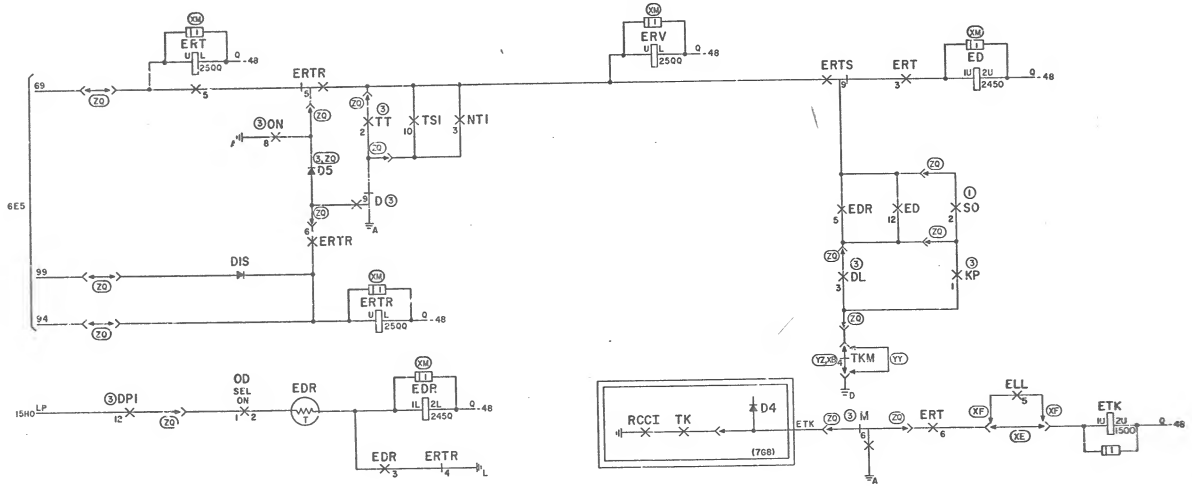
BELL TELEPHONE LABORATORIES INCORPORATED

SD-99311-01-B14

⑦PART OF FS 17

EXTENDED TEST TRUNK CONTROL





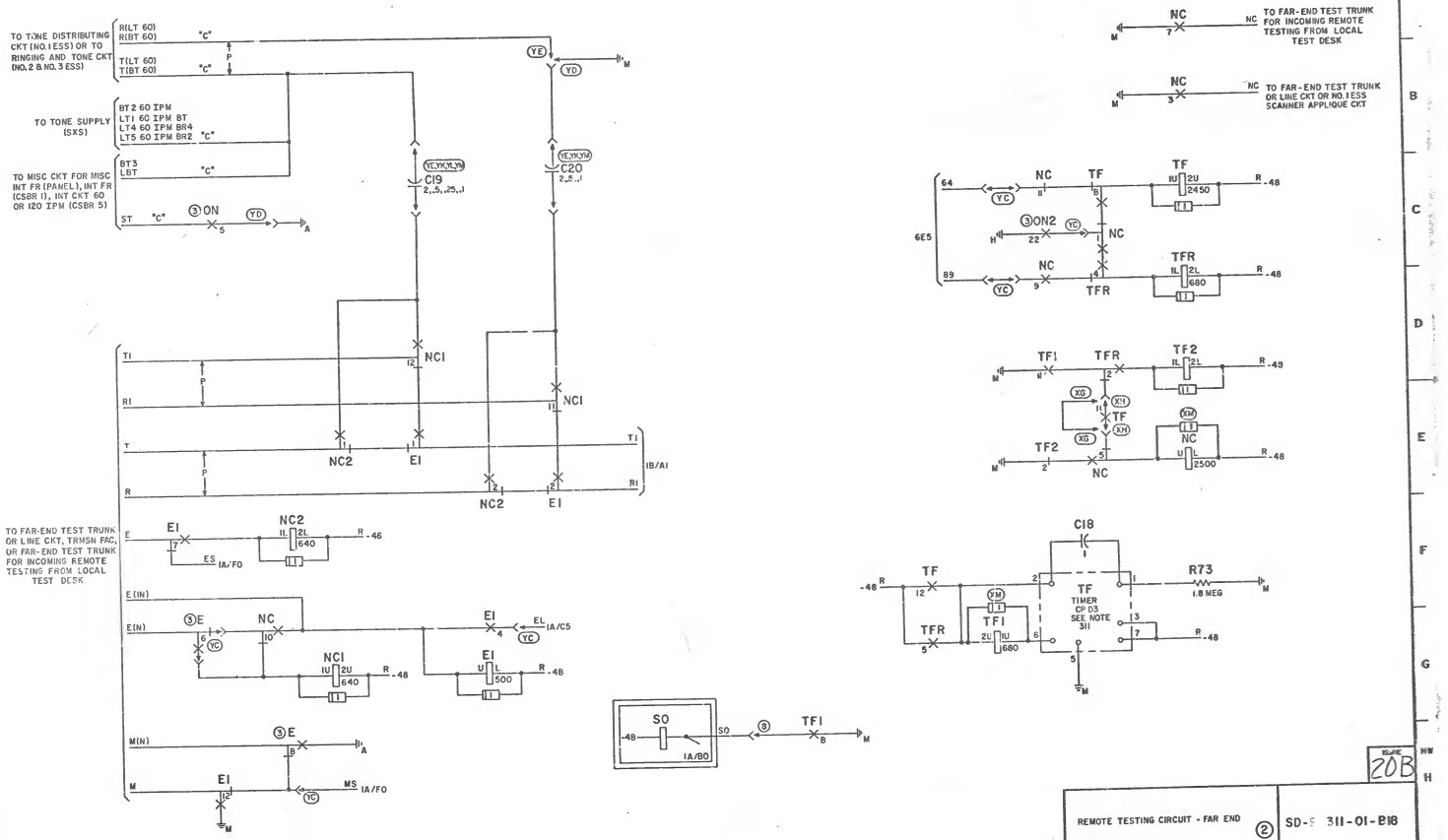
ISSUE 20B

REMOTE TESTING CIRCUIT-FAR END ② SD-99311-01-B16

BELL TELEPHONE LABORATORIES INCORPORATED 6S

SD-99311-01-B16

⑧FS 19
NIGHT TEST TRANSFER



REMOTE TESTING CIRCUIT - FAR END (2)	SD-9 311-01-818
BELL TELEPHONE LABORATORIES INCORPORATED	6S

SHEET 20B

9-9311-01-818

APP FIG. I

RELAY

DESIG	CT		CTR						GT		GT1		NT2		1 2		SO		ROHD						DESIG
CODE	AK22								AK13				AK 22				AK22								CODE
OPTION	ZP		ZP										YV		YV										OPTION
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	
12			EBM								EBM		EBM	13B/D4					EBM	12D7					12
11			EBM	1B/G1							EBM	5H1	EBM	13B/D4					EBM						11
10			EBM								EBM	10E5	EBM						EBM						10
9			EMB								EM		EMB	13B/D4					EMB						9
8			EMB	1B/F1							EM		EMB						EMB						8
7																									7
6																									6
5	EMB	1B/G1							EM	1B/D1					EMB		EMB	1A/C5							5
4	EMB	1A/E6							EM						EMB	13B/D5	EMB								4
3	EBM	14B3							EBM	1A/C5					EBM	13A/G5	EBM	1A/G9							3
2	EBM								EBM	5A9					EBM	13B/D5	EBM	16C7							2
1	EBM	14B2							EBM	4A8					EBM	13B/D5	EB"	11F3							1
COIL		1B/G2		1B/F2						4A8		5A8		13A/E4		13A/D4		1A/B1		12C7					COIL

AMPLIFIER

DESIG	LOC	CODE
AMP	1A/C3	(ZC) 227A
		(ZD) 227E

CAPACITOR

DESIG	LOC	CODE
C2	1A/D8	KS-16390 L3
C3	1A/D9	KS-16390 L3
(YV) C21	13B/D4	542F
(YV) C22	13B/D4	542F

CIRCUIT PACK

DESIG	AND (CPS 3)		DR1 (CPS 6)		DR2 (CPS 7)		(CPS1)		
CODE	ED-99433		ED-99436		ED-99437		ED-99435		
	TERM	LOC	TERM	LOC	TERM	LOC	TERM	DESIG	LOC
	A-F	4A5	A-C	5D0	A,B	5F1	A-F	SO	1A/F6
	K-L	10E4	D-G	4A1	C-K	4D2	G,H		5C8
	M,N	5G0	J-M	4A1	L,M	5F1	J-N		1A/F6
	P	5G0	N	5D0	N	12C6	P	BIAS	2G2
	T,U	4A5	P	5D0	P	12C6	R-U	AMP	2G2
			R	5D0	R-T	12C6			
			S-U	4A1					

CIRCUIT PACK

DESIG	LOC	CODE
ABC	5A8	ED (DIMMER)
GRP A	3AC	AND (CPS 3)
GRP B	3D3	AMP (CPS 4)
GRP C	3F3	AMB (CPS 5)
PREAMP	2A4	AMB (CPS 2)

DIODE

DESIG	LOC	CODE
CR1	2F1	(ZG) 425D
		(ZH) 485D
CR2	1A/C6	446A
CR3	1A/D6	446A
CR4	1A/D9	(ZG) 425C
		(ZH) 485C
		446F
CR5	4A8	
(ZP) CT	1B/G2	446F
(ZP) CTR	1B/E2	446F

FILTER

DESIG	LOC	CODE
BRF	2F1	736A
CAF	3F1	637B
LPF	1A/C5	201K

INDUCTOR

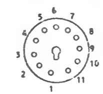
DESIG	LOC	CODE
OSC	1A/G4	1594A,1.45H

NETWORK

DESIG	LOC	CODE
(ZP) CT	1B/G2	185A
(YV) NT2	13A/E4	185A
SO	1A/B1	185A
(YV) TS2	13A/E4	185A
(YM) GT1	5A8	185A
ROHD	12C7	185A

OSCILLATOR

DESIG	LOC	CODE
CCO	1A/C8	KS-19397,L1



PAD

DESIG	LOC	CODE
REC	2A0	1C E/W 898L RCS

POTENTIOMETER

DESIG	LOC	CODE
ADJ	2G2	KS-14381 L5, 2500
SENS	1A/D7	KS-14381 L3, 100
SO	1A/F4	KS-14381 L5, 2500
ZERO	1A/D7	KS-14381 L3, 100

RESISTORS

DESIG	LOC	CODE
R1	1A/C2	180A
R2	1A/D2	180A
R3	1A/C3	228A,1960
R4	1A/D3	228A,1430
R6	2E1	18H
R9	1A/B5	18HL
R10	1A/D7	18JC
R13	1A/E7	KS-8512,L17C, 68.1
R14	4A9	KS-16266,L3A, 1000
R15	4B6	188A
R16	1A/C7	19RB
R17	1A/B7	19EH
R20	1A/B5	18HL
R43	2E1	18BT
R60	5A9	~~221A~~, KS-20810,L1A,133
R61	5A6	~~237A~~, KS-20616,L1A,46,400

SWITCH

DESIG	LOC	CODE
SS	1A/E7	17AC1-T MICRO-SWITCH CO. FREEPORT, ILL.

TEST POINTS

DESIG	LOC	CODE
(S) -22V	1A/E9	KS-14523,L2
-34V	2G0	KS-14523,L2

TRANSFORMER

DESIG	LOC	CODE
T1	1A/F9	2576G
T2	1A/C6	139G (RPT COIL)
T3	1A/C6	139G (RPT COIL)

TRANSISTOR

DESIG	LOC	CODE
Q1	2G1	9A

2A 3A 4D 5A 6B 7A 10B

ISSUE 20B

REMOTE TESTING CIRCUIT - FAR END (2)

BELL TELEPHONE LABORATORIES INCORPORATED 6S

SD-99311-01-C1

SD-99311-01-C1

APP FIG. 2

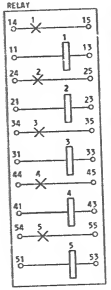
RELAY

DESIG				C1		C2		C3		C4										DESIG
CODE				AK2				AK2												CODE
OPTION																				OPTION
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	
12							M	6C4	M	6C9										12
11							M	6C4	M	6C8										11
10							M	6C4	M	6C8										10
9							M	6C3	M	6C8										9
8							M	6C3	M	6C7										8
7																				7
6																				6
5					M	6C2			M	6C7										5
4					M	6C2			M	6C6										4
3					M	6C1			M	6C6										3
2					M	6C1			M	6C5										2
1					W	6C0			M	6C5										1
COIL						5C5		5H5		5H5										COIL

RELAY

DESIG	B1	B2	B3	B4	B5				DESIG
CODE	AJ202	AJ202	AJ202	AJ202	AJ202				CODE
OPTION									OPTION
	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	
24									24
23	6D9	6D9	6D9	6D9	6D9				23
22	6D8	6D8	6D8	6D8	6D8				22
21	6D7	6D7	6D7	6D7	6D7				21
20	6D6	6D6	6D6	6D6	6D6				20
19	6D7	6D7	6D7	6D7	6D7				19
18									18
17	6D6	6D6	6D6	6D6	6D6				17
16	6D6	6D6	6D6	6D6	6D6				16
15	6D6	6D6	6D6	6D6	6D6				15
14	6D5	6D5	6D5	6D5	6D5				14
13	6D5	6D5	6D5	6D5	6D5				13
12									12
11	6D4	6D4	6D4	6D4	6D4				11
10	6D4	6D4	6D4	6D4	6D4				10
9	6D4	6D4	6D4	6D4	6D4				9
8	6D3	6D3	6D3	6D3	6D3				8
7	6D3	6D3	6D3	6D3	6D3				7
6									6
5	6D2	6D2	6D2	6D2	6D2				5
4	6D2	6D2	6D2	6D2	6D2				4
3	6D1	6D1	6D1	6D1	6D1				3
2	6D1	6D1	6D1	6D1	6D1				2
1	6D1	6D1	6D1	6D1	6D1				1
COIL	5D5	5D5	5C5	5D5	5D5				COIL

RELAY



DESIG	B1	B2	B3	B4	B5
CODE	293E				
OPTION					
COIL POS	1	2	3	4	5
COIL LOC	5E2	5E2	5E2	5E2	5F1
CONT POS	5E2	5E2	5E2	5E2	5F2

DESIG	K1A	K2A	K3A	K4A	K5A
CODE	293E				
OPTION					
COIL POS	1	2	3	4	5
COIL LOC	5B1	5B1	5B1	5C1	5D1
CONT POS	5B2	5B2	5E2	5C2	5D2

DESIG	K1C	K2C	K3C	K4C	K5C
CODE	293E				
OPTION					
COIL POS	1	2	3	4	5
COIL LOC	5G2	5G2	5G2	5G2	5G9
CONT POS	5G2	5G2	5G2	5G2	5B9

NETWORK

DESIG	LOC	CODE
A1,A2	5B5	
A3,A4	5C5	
A5	5D5	
B1,B2	5E2	
B3,B4	5F2	
B5	5F1	
C1,C2	5G5	
C3,C4	5H5	IB5A
K1A	5A1	
K2A,K3A	5B1	
K4A	5C1	
K5A	5D1	
K1C,K2C,K3C	5G2	
K4C	5H2	
K5C	5B9	
Z1	5A4	4034A

ISSUE 20B

REMOTE TESTING CIRCUIT - FAR END

SD-99311-01-C2

BELL TELEPHONE LABORATORIES INCORPORATED

SD-99311-C2

PART OF APP FIG. 3

RELAY

DESIG	3AO		3AOR				6OV		6OVR			
CODE	AK22						AK22					
OPTION												
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC
12			EBM	13A/D2					[illegible]	10C7		
11			EBM						[illegible]			
10			EBM						EBM			
9			EMB						[illegible]			
8			EMB						[illegible]			
7												
6												
5	EMB	15C6					EMB	[illegible]				
4	EMB	3A/D2					EMB					
3	EBM	10A5					EBM					
2	EBM	10B5					EBM	1A/B6				
1	BM	a					EBM	[illegible]				
COIL		13A/C2		13A/H2				10C6		10F8		

a: (YZ,XB) 13B/C1; (YY) 13B/E1

DESIG	CC		CCR				LN		LR		LPR		DESIG
CODE	AK22						AJ34		AK22				CODE
OPTION													OPTION
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	
12			M	9E2			M				EBM	9F2	12
11			EBM				M				EBM		11
10			EBM				EBM	9B5			EBM		10
9			[illegible]								EMB		9
8			[illegible]				EBM	1A/B5			EMB		8
7													7
6							EBM						6
5	MB	9E2							MB	9F2			5
4	EMB	9E6					EBM	9A5	EMB	9F5			4
3	EBM	1A/B6							EBM	1A/B6			3
2	EBM	9B4					EBM		EBM	9B5			2
1	EBM	9C5					M		EBM	9F4			1
COIL		9E2		9G2				9G6		9F2		9H2	COIL

RELAY

DESIG	D		DIS		RCCIR		DL		LL1		LP	
CODE	AJ15		AK30				AG20		AK6			
OPTION												
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC
12	EBM	12E1	M	12E0			M	12H5			BM	15H0
11	EBM	15E7	EBM	1A/B4			M	12G3			BM	10C5
10	EBM	1B/F2	EBM	1A/A4			EBM	13B/C1			BM	12E1
9	EBM	16B3	EMB	1A/B4			M	15B5			BM	
8	EMB	14B5	EMB	1B/F2			EBM	13A/B1			BM	12C2
7	EBM											
6	EMB	14B5					EMB	5B9				
5	EMB				EMB				BM	12C5		
4	EBM	13B/G2			EMB		EBM	13B/G2	BM	12D1		
3	EBM				EBM		M	16C7	BM	12G7		
2	EBM	13B/E6			EBM	a	EBM	7D3	BM	12A2		
1	EBM	13B/C7			M		M	12G7	BM	12B1		
COIL		13A/G6		1B/E2		7D0		12F8		12C8		12D6

a: (E) 7E1; (F) 7E2

DESIG	DP		DP1		DS1		E		F		FP		DESIG
CODE	AK8				AG13		AF144		AK22				CODE
OPTION													OPTION
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	
12			M	16D1							EBM	9D2	12
11			M	12H2							EBM		11
10			EBM		ED1	12H5					EBM		10
9			EMB	12E6							EMB		9
8			EM				EMB	18G2			EMB		8
7													7
6					EBM		EMB	18F1					6
5	EM	12F7							EMB	9D2			5
4	B				P1	12D6	M	1A/A4	EMB				4
3	EBM								EBM				3
2	EBM	12F7							EBM				2
1	M	12E6							EBM	9B7			1
COIL		12F2		12F8		12H3		1A/E1		9C2		9G1	COIL

RELAY

DESIG	G		GR				IN		INR		KP	
CODE	AK22						AK22				AF20	
OPTION												
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC
12			EBM	7H5					[illegible]	13A/E2	EMB	7C3
11			EBM						[illegible]		M	15A3
10			EBM						[illegible]		EBM	7C3
9			EMB									
8			EMB						[illegible]		EBM	12H3
7												
6											EMB	13B/C1
5	EMB	7G5					[illegible]	10C6				
4	EMB							13A/E2			EMB	a
3	EBM							[illegible]				
2	EBM	9A4					[illegible]	[illegible]			EBM	7F9
1	EBM	7?8					[illegible]	[illegible]			M	b
COIL		7G5		7F5				13A/E2		13A/A2		7H0

KP: a: (ZQ) 7F9; (ZR) 7H1 — b: (ZQ) 16C1; (ZR) 7F9

DESIG	KPR		MR		LL		REXS		LL1		REX1		DESIG
CODE	AK5				AK44				AK22				CODE
OPTION					N,ZS		N,ZQ		ZJ		ZJ		OPTION
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	
12	M				EBM	11D7					EBM	7A6	12
11	M				M	[illegible]					EBM	11F7	11
10	B				EBM	[illegible]					EBM		10
9	B	a			[illegible]	[illegible]					EMB	11G7	9
8					M	11D7					EMB	11C4	8
7													7
6													6
5							M		EMB	11F7			5
4			B	7G2			M	7B2	[illegible]				4
3			B				M	7?2	M				3
2			B				[illegible]	7B1	M	11G7			2
1			M				M	7B2	EBM	11C3			1
COIL		7E5		7L5		14B8		11F5		11G4		11H4	COIL

KPR: a: (ZQ) 7H1; (ZR) 7H1

RELAY

DESIG	LKP		LPPR				M		MA		MAR	
CODE	AK22						AJ516		AK22			
OPTION												
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC
12			[illegible]	[illegible]			[illegible]	7B1			[illegible]	10C7
11			[illegible]				EMB	[illegible]			[illegible]	
10							EBM	7C1			[illegible]	
9							EMB	b			[illegible]	
8							EBM	1A/E6			[illegible]	
7							EBM	[illegible]				
6							EBM	16D7				
5	[illegible]	[illegible]					[illegible]	[illegible]	MB	1A/B7		
4	[illegible]						EBM	[illegible]	[illegible]			
3	[illegible]	8C3					MB	[illegible]	M	1A/B7		
2	EBM						EBM	7G1	M	[illegible]		
1	EBM						EMB	a	M	[illegible]		
COIL		10E8		10C7				7D0		[illegible]		10F8

M: a: (XA) 7B6; (XB) 7C6 — b: (XA) 7D6; (XB) 7D6

DESIG	MDF		MDFR				NP		NT		NTR		DESIG
CODE	AK22						AG19		AK22				CODE
OPTION													OPTION
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	
12			EBM	13A/D1							EBM	13A/F2	12
11			EBM								EBM		11
10			EBM				EBM	13B/F1			EBM	13A/G5	10
9			EMB								EMB		9
8			EMB								EMB		8
7													7
6													6
5	[illegible]	15F7							MB	13B/C6			5
4	[illegible]	13A/D2							[illegible]	13B/F2			4
3	[illegible]	13B/C5							EBM	13B/C6			3
2	[illegible]	13B/B5					P&EM	12G8	EBM	13B/B6			2
1	[illegible]	13B/A5							EBM	13B/A7			1
COIL		13A/D2		13A/B2				13B/F2		13A/F2		13A/A2	COIL

DRAWING ISSUE
7A
8AC
9B
10B
12B

ISSUE 19AC

REMOTE TESTING CIRCUIT - FAR END ②

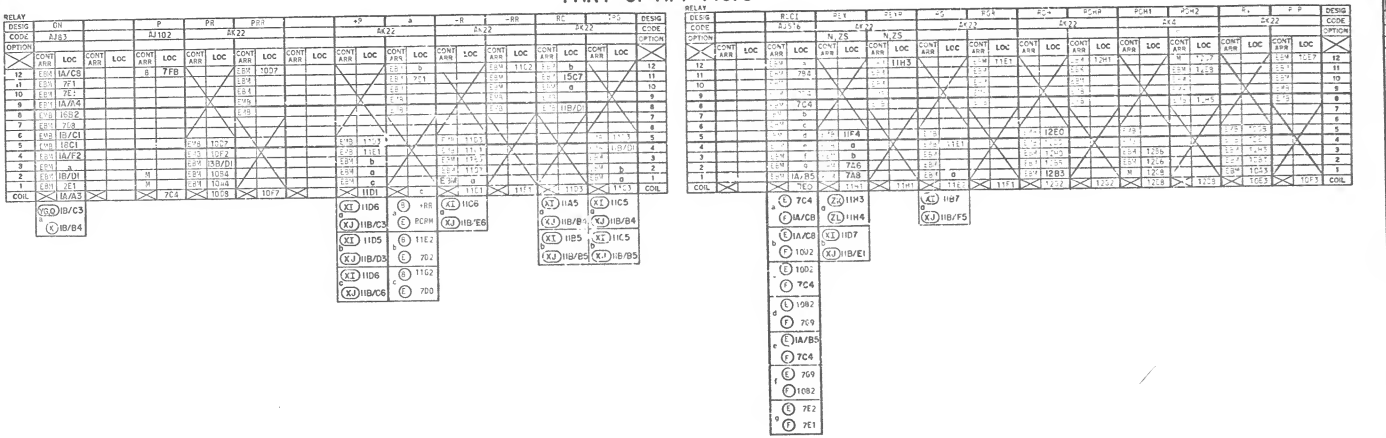
SD-99311-01-C3

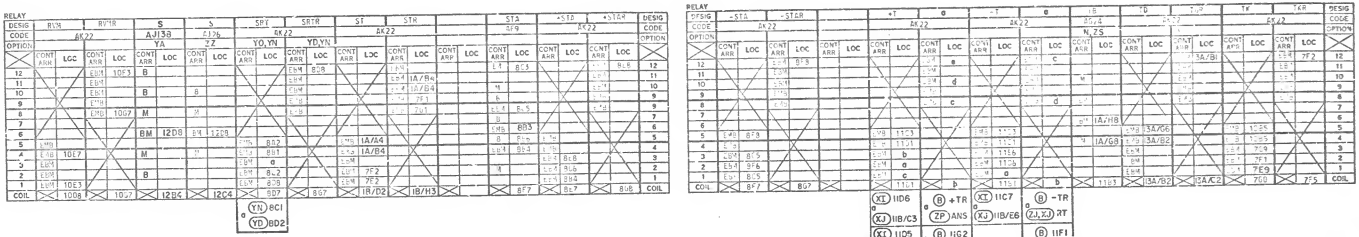
BELL TELEPHONE LABORATORIES INCORPORATED

6S

SD-99311-01-C3

PART OF APP FIG. 3





DRAWING ISSUE: 7A, 8AC, 9B, 10B, 12B

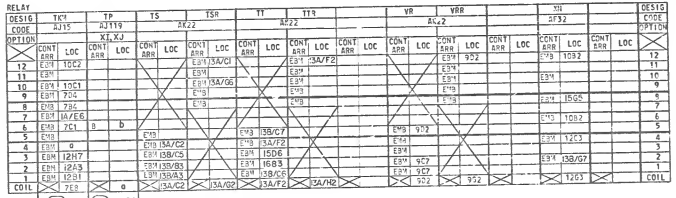
ISSUE 19AC

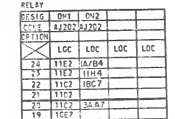
REMOTE TESTING CIRCUIT - FSR END (2) SD-5 3 -01-C4

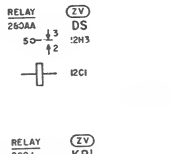
BELL TELEPHONE LABORATORIES INCORPORATED GS

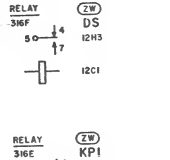
D-59311-01-C4

PART OF APP FIG. 3









CAPACITOR

DESIG	LOC	CODE
C6	7C3	437A
C7	12B2	439A
C8	8D2	439A
(YN,YO) C9	8D2	437A
C10	9B4	439A
C11	12C5	437A
C13	7D7	KS-16390 L1
(N,ZS) CI4	IA/GB	570LH
(Q,YG) CI5	IB/B3	542G

CIRCUIT PACK

DESIG	LOC	CODE
(ZJ) RT	11G6	ED-2H053-( )(CPS 9)
TMR	12D3	CF1
(XJ,ZJ,ZY) 24V	7A7	ED-2H052-( )(CPS 10)
(XJ) RT	11B/C2	ED-2H114-( )(CPS 9)

AMPLIFIER

DESIG	LOC	CODE
M	7C7	KS-19328, L1

DIODE

DESIG	LOC	CODE
CRB	10E3	458A
(E) CR9	7E2	446F
CR10	7E1	
(N,ZS) D1	7A9	
D2	11B3	
(ZQ) D4	7G8	
D5	16B3	
(YX) D6	DB2	459BF
D7		459BG
D8	8C2	459BF
D9		459BG
DIS	18/E2	446F
(XF) KP	7F9	
ON	IA/A3	
(ZJ,XJ) RT	11G6, 11B/C1	
(XM) SL	13B/C2	

INDUCTOR

DESIG	LOC	CODE
BR	10C5	274S
L	10D5	274F
(YO) RT	8D1	274P

JACK

239C

	DS	KPI	HYD	HYL	TJI
5 C4	12C2	785	IB/A7	IB/B3	14A1
3 C2	1281	7D5	IB/A7	IB/B3	14B1
1					

LAMP

DESIG	LOC	CODE
B	10E1	138(RES)
M	IA/F2	138(RES)
N	9E4	138(RES)
P	9E5	138(RES)
(XI, XJ) RI	11C7, 11B/D7	130(RES)
(XI, XJ) R2	11E7, 11B/C7	130(RES)
RT	BE2	(S) 130(RES) (YO,R) 130(RES)

NETWORK

DESIG	LOC	CODE
3WO	13A/C3	
(XM) 3WOR	13A/H2	
60V	10C8	
(XM) 60VR	10F8	
(ZP) ANS	IA/A1	
CC	11E2	
(XM) CCR	9G2	
CK	9C6	
CR	9F2	
(XM) CRR	8H5	
D	13A/G6	
DL	12F8	
DL1	12G8	
DP	12F2	
DP1	12F8	
DS1	12H3	
E	IA/E1	
F	9C2	
(XM) FR	9G1	
(XM) GR	7F5	
IN	13A/E2	
(XM) INR	13A/A2	
(XM) KPR	7E5	
(N,ZS) LL	14G8	
(XM) LLR	11G4	
LP	12D6	
(XM) LRP	10E5	
LRPR	10G7	
MA	10B8	
(XM) MAR	10F8	
MDF	13A/D2	
(XM) MDFR	13A/D2	
MR	7E5	
NP	13B/F2	
NT	13A/E2	
(XM) NTR	13A/A2	
ON1	IA/B3	
ON2	13A/B5	
P1	7C4	
P2	7C4	
PR	10G8	
(XM) PRR	10F7	
+R	11G1	
(XM) +RR	11G2	
-R	11C1	
(XM) -RR	11F1	
RL	10C4	

CODE

185A

NETWORK (CONT)

DESIG	LOC	CODE
RC	11D3	
RCC1	7E0	
(XM) RCCIR	7D0	
(E) RCRM	11H1	
(N,ZS) REX	11H4	
(ZJ,XJ) REXR	11H1	
(XM) (N,ZS) REXS	11F5	
RG	11F2	
(XM) RGR	11F1	
RON	12E8	
RON1	12E8	
RON2	12D8	
(XM) RONR	12D2	
(R,YO) RT	8D1	
RV	10E3	
RVM	10D8	
RVMR	10G7	
(XM) RVR	10F3	
S	12B4	
(XM) S	12C4	185A
(YN,YO) SRT	8D7	
(XM) SRTR	8G2	
SST	11D2/D2	
STA	8E7	
+STA	8E7	
-STA	8E7	
(XM) +STAR	8E7	
(XM) -STAR	8E8	
(XM) STR	8E/H3	
(XM) +T	11D1	
(XM) -T	11B1	
(Q,YG) TR	11B/E2	
(XM) TRR	11B/G2	
(XM) TS	11A/B5	
(XM) TSR	13A/B2	
(XM) TDR	13A/G2	
TK	7G0	
TKM	7E8	
(XM) TKR	7F5	
TRS	11C3	
(XM) +TR	11B/E2	
TS	13A/C2	
(XM) TSR	13A/C2	
TT	13A/F2	
(XM) TTR	13A/H2	
VR	9D2	
(XM) VRR	9G2	
XN	12B3	

POTENTIOMETER

DESIG	LOC	CODE
DTM	12C0	KS-13790, L25
H	18/B9	KS-14381, L10

RESISTOR

DESIG	LOC	CODE
HR	12C8	~~221A~~ KS-20810, L1A, 432
HT	12C8	~~221A~~ KS-20810, L1A, 432
R18	IA/B7	~~106A~~, KS-20810L1A, L05
R22	IA/F1	185M
R23	18/C2, B7	(YF) 18GH, (YG) 1/2 19 MD
R24	7C1	136H
(ZV) R25	12C0	185
R26	12B2	184E
(YN,YO) R28	8C2	188L
R29	8D3	408M
R30	9B4	198F
R31	IA/B7	~~107A~~, KS-20810 L1A; 48,700
R32	IA/B6	~~107A~~ KS-20810 L1A; 45,900
R33	10B4	188F
R34	10D5	188P
R35	13B/F1	188F
R36	13B/F1	180N
R37	13B/C1	184K
R38	13B/G3	188H
R41	13B/C7	188H

RESISTOR

DESIG	LOC	CODE
R42	13B/E7	188H
R43	7D7	186
R44	12D1	~~221A~~, KS-20810, L1A, 19,600
(YN,YO) 17	8D2	176A (RPT CC1L)
T8	12C5	94E (RPT COIL)
R45	12D1	~~221A~~, KS-20810, L1A, 1.69 MEG
R46	12E1	KS-13492, L1, 3300
(YO) R47	13D/E6	188E
(N,ZS) R49	11B3	KS-13491 L1, 1600
(Q,YG) R50	18/B3	188H
(H) R62	9A4	187Y
(ZJ,XJ) R63	11F7, 11B/C4	KS-14603, L1BD, 200
(XJ,ZJ,ZY) R64	7A5	KS-14603, L1CD, 316
(ZQ) R66	15C7	221B, 9530
(ZQ) R68	17F5	KS-14603 ,LIB 1430
(YG) R72	18/C8	1/2 19 MD
(XJ) RT	11B/C1	KS-20289, L4(C), 464
(XJ) RT1	11B/B1	KS-20289, L4(C), 1670

TRANSFORMER

DESIG	LOC	CODE
T4	15/B6	120J (RPT COIL)
T5	18/B7	120J (RPT COIL)
T6	7C3	120K (RPT COIL)
T7	8D2	176A (RPT CC1L)
T8	12C5	94E (RPT COIL)

VARISTOR

DESIG	LOC	CODE
RV1	IB/A6	100A
RV2	IB/A6	100A

REMOTE TESTING CIRCUIT - FAR END

(2) SD- 11-01-C5

BELL TELEPHONE LABORATORIES INCORPORATED

ISSUE 20B

SD-93311-01-05

APP FIG. 4

BATTERY DESIG	LOC	CODE	FUSE DESIG	LOC	CODE	LAMP DESIG	LOC	CODE
B1	14F1, 14G1	[6] KS-6573	+20	14G0		S+	14F2	13L (RES)
B2	14F1	EVEREADY NO. 773 OR KS-15998	+50	14G0	70G 1/2 AMP			
			+100	14F0				
			+116	14F1				

APP FIG. 5

BATTERY DESIG	LOC	CODE	FUSE DESIG	LOC	CODE	LAMP DESIG	LOC	CODE
B3	14F3	[6] KS-6573	-116	14F3	70G 1/2 AMP	S-	14F4	13L (RES)

APP FIG. 6

LAMP DESIG	LOC	CODE
S+	14F9	13L (RES)
S-	14F9	13L (RES)

ISSUE 15D

REMOTE TESTING CIRCUIT - FAR-END ②

BELL TELEPHONE LABORATORIES INCORPORATED

6S

SD-9311-01-C6

APP FIG. 7

RELAY

DESIG					EDR		ED		ELL		ETK						ERT		ERV		DESIG
CODE					AK4				AK47								AJ15		AJ83		CODE
OPTION																					OPTION
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	
12							M	16C7			M						EBM	14B4	EBM	15C7	12
11							EBM				EBM	15G6					EBM	7B8	EBM	15F7	11
10							EBM	15B2			EBM						EBM	14B4	EDM	15E7	10
9							EMB				EMB	11F4					EBM	15G1	EBM		9
8							EMB	15B2			EMB						EMB	15E1	EMB	15B8	8
7																	EBM	13B/E1	EBM		7
6																	EMB	16D7	EMB	15C8	6
5					EMB	16C7			EMB	16C8							EMB	16A2	EMB		5
4					EMB				EMB								EBM	15E1	EBM		4
3					EBM	16E3			EBM	15C6							EBM	16A7	EBM		3
2					EBM	13B/F8			EBM								EBM	7A5	EBM		2
1					M	15C2			M	14C8							EBM	13B/D2	EBM		1
COIL						16D4		16A8		15G5		16D9						16A2		16A5	COIL

RELAY

DESIG	ERTR						HR		ERTS						NTI		TSI				DESIG
CODE	AJ15						AK47								AK4						CODE
OPTION																					OPTION
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	
12	EBM	12E0							M								M	15G6			12
11	EBM	15D1							EBM	15G1							EBM				11
10	EBM	15E6							EBM	15C2							EBM	16B3			10
9	EBM								EMB	16A7							EMB	15C6			9
8	EMB								EMB	15D7							EMB				8
7	EBM	15G6																			7
6	EMB	16C3																			6
5	EMB	16A3					EMB	15D5							EMB	15C5					5
4	EBM	16E4					EMB	15C6							EM3						4
3	[illegible]	15C2,15G1					EBM	15C8							EBM	16B4					3
2	EBM						EBM	15C7							EBM						2
1	EBM	15F6					M								M	15F6					1
COIL		16C3						13B/F1		15D3						15E2		15E2			COIL

AMPLIFIER

DESIG	LOC	CODE
AMP 1	17B4	227D
AMP 2	17D4	227D

CAPACITOR

DESIG	LOC	CODE
C16	17D3	439A
C17	17D8	439A

DIODE

DESIG	LOC	CODE
D3	7A8	446F
DIS	16C2	446F
HR	15C6	446F

LAMP

DESIG	LOC	CODE
HR	15F7	13J (RES)

NETWORK

	DESIG	LOC	CODE
	ED	16A8	185A
	EDR	16D3	
	ELL	15G5	
XM	ERT	16A2	
	ERTR	16C3	
	ERTS	15C3	
	ERV	16A5	
	ETK	16D8	
XM	HR	13B/F0	
	NTI	15F2	
	OD	15H2	177E
	ODR	15G1	177E
XM	TSI	15E2	185A

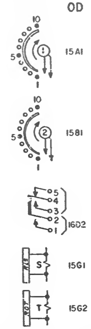
RESISTOR

DESIG	LOC	CODE
R65	15B7	147A,16000
R67	15B6	18EC,6000
R69	15B3	188J,1200
R70	15A2	18EF,2500
R71	15B8	18EF,2500

SELECTOR

204C

OD



THERMISTOR

DESIG	LOC	CODE
EDR	16D3	8C

TRANSFORMER

DESIG	LOC	CODE
T9	17C2	181B (IND COIL)
T10	17C7	181B (IND COIL)

ISSUE 20B

REMOTE TESTING CIRCUIT - FAR END ②

BELL TELEPHONE LABORATORIES INCORPORATED

6S

SD-99311-01-C7

APP FIG. 8

RELAY DESIG / CODE / OPTION	CONT ARR	LOC	CONT ARR	LOC	E1 AJ43 CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	NC AJ83 CONT ARR	LOC	NC2 AK22 CONT ARR	LOC	NCI AK22 CONT ARR	LOC	CONT ARR	LOC	DESIG / CODE / OPTION
12					EBM	18H1							EBM				EBM	18D3			12
11					EBM								EBM	18C7			EBM	18E4			11
10					EBM	18A4							EBM	18F1			EBM				10
9					EBM	18C5							EBM	18C7			EMB				9
8					EMB								EMB				EMB				8
7					EBM	18F1							EBM	18A6							7
6					EMB								EMB								6
5					EMB	18B9							EMB	18E7	EMB						5
4					EBM	18F3							EBM		EMB						4
3					EBM	18B5							EBM	18D8	EBM						3
2					EBM	18E3							EBM		EBM	18E3					2
1					EBM	18E2							EEM	18C8	EBM	18F2					1
COIL						18B3								18E8		18F2		18B2			COIL

RELAY DESIG / CODE / OPTION	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	TF2 AK41 CONT ARR	LOC	TF1 AK41 CONT ARR	LOC	TFR AK35 CONT ARR	LOC	TF AK35 CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	DESIG / CODE / OPTION
12									M				M	18F6							12
11									EBM	18D7			EBM	18E8							11
10									EBM				EBM								10
9									EMB				EMB								9
8									EMB	18B5			EMB	18C7							8
7																					7
6											CMB	18B6									6
5							CMB				EMB	18D7									5
4							EMB				EBM										4
3							EBM	18E7			EBM	18D7									3
2							M				M										2
1								18D8		18D7		18C8		18C8							1
COIL																					COIL

CIRCUIT PACK

DESIG	LOC	CODE
TF	18F7	D3

CAPACITORS

	DESIG	LOC	CODE
	C18	18F7	535GB
	C19	18C3	441D (YL)
[1]	C19	18C3	437E (YE)
[1]	C20	18C3	441C (YK)
[1]			441T (YH)

NETWORKS

	DESIG	LOC	CODE
	E1	18G3	185A
(XH)	NC	18L8	
	NCI	18G2	
	NC2	18F2	
	TF	18C6	
(XU)	TF1	18F7	
	TF2	18D8	
	TFR	18C8	

RESISTOR

DESIG	LOC	CODE
R73	18F8	KS-19150,L1,1.8 MEG

APP FIG. 9

RELAY DESIG / CODE / OPTION	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	LS AJ516 YS CONT ARR	LOC	CONT ARR	LOC	SPARE AK22 CONT ARR	LOC	LSR YS CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	DESIG / CODE / OPTION
12							EBM						EBM	13A/A7							12
11							EMB						EBM								11
10							EBM						EBM								10
9							EMB	13B/F7					EMB								9
8							EBM						EMB								8
7							EM														7
6							EBM	13B/C4													6
5							BM	15G7			EMB										5
4							EBM	13B/B4			EMB										4
3							EBM	13B/A4			EBM										3
2							EBM	13A/A4			EBM										2
1							EMB	13A/A7			EBM										1
COIL								13A/A7				13A/B8									COIL

RELAY DESIG / CODE / OPTION	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	DESIG / CODE / OPTION
12																					12
11																					11
10																					10
9																					9
8																					8
7																					7
6																					6
5																					5
4																					4
3																					3
2																					2
1																					1
COIL																					COIL

NETWORK

	DESIG	LOC	CODE
(YS)	LS	13A/A7	185A
(XM)	LSR	13A/B8	185A

ISSUE 20B HW

REMOTE TESTING CIRCUIT - FAR END

BELL TELEPHONE LABORATORIES INCORPORATED

SD-[illegible] 1-01-C8 (2) 6S

SD-99311-01-C8

CIRCUIT NOTES:

101.

DESIG	FUSE AMP	POTENTIAL	ONE FER
A			APP FIG. 3
B		-48 SIG	
C*			APP FIG. 1
D			
E*		-48 TALK	APP FIG. 3
F*			APP FIG. 1
G*			
H	1-1/3		APP FIG. 2
J			
K			
L		-48 SIG	APP FIG. 3
M			
N			
O			
P			APP FIG. 7
Q			APP FIG. 8
R			
A	1-1/3	-72 TALK	APP FIG. 3
	1/2 HV	SUP-, AC-DC AUD, OR SUP- AUD	APP FIG. 3
	1/2 HV		APP FIG. 3
	1/2 HV	105 ±V RINGING	APP FIG. 3 (S OPTION)
	100		APP FIG. 3 (R OPTION)
	1/2 HV	SUP+ OR SUP+ AUD	APP FIG. 3
CC-	1/2 HV	CC-	APP FIG. 3 (T OPTION)
CC+		CC+	
A			APP FIG. 1, 3
B			APP FIG. 2
C*			APP FIG. 1
D			APP FIG. 3
E*			APP FIG. 3
F*		GRD	APP FIG. 1
G*			APP FIG. 1
H			APP FIG. 3
J			APP FIG. 3
K			APP FIG. 4 OR 5
L			APP FIG. 7
M			APP FIG. 8

* BATTERY LEADS SHALL BE PAIRED WITH THEIR INDIVIDUAL GROUND LEADS TO THE FUSE PANEL.

BATTERY SYMBOL	VOLTAGE RANGE
-48	-42.75 TO -52.5
-72	-66 TO -75
CC-	-115 TO -125
CC+	+115 TO +135

CIRCUIT NOTES (CONT)

102.

FEATURE OR OPTION				APP FIG.	PROVIDE: APP OR WRG	QUANTITY
REMOTE TEST CIRCUIT				1,2,3		1 PER CKT
				4		1 PER CKT
TEST VOLTAGE OBTAINED FROM	DRY BATTERIES (KS-6875)	TUBE TYPE STATION RINGING TEST REQUIRED	REGULATED COIN CONT SUPPLY IS 116-120V		V	
			OTHERWISE	5	W	1 PER CKT
	CONNECTION TO TEST VOLTAGE SUPPLY CKT	TUBE TYPE STATION RINGING TEST REQUIRED		6	W	
OPERATION WITH ESS OFFICE	REQUIRED				YQ	
	NOT REQUIRED				YR	
RANGE EXTENSION FOR UNIGAUGE WITHOUT EXTENDED REMOTE TESTING	REQUIRED	NO. 5 CSBR OFFICE			N, ZT, ZM, ZR, XT, XK	
		NO. 2 ESS OFFICE (SEE NOTE 109)			N, ZM, XJ, XK	
	NOT REQUIRED (SEE NOTE 108)	NO. 2 ESS OFFICE			ZN, ZQ, ZU, XJ, XN	
		ALL OTHER OFFICES				
COIN LINE TESTING	REQUIRED	SOME OF THE STATIONS ARE DIAL TONE FIRST			T, Y, H	
		ALL STATIONS ARE COIN FIRST POSITIVE COLLECT			T, Y, J	
		ALL STATIONS ARE COIN FIRST NEGATIVE COLLECT			T, X, J	
	NOT REQUIRED				Y	
INCOMING TEST CALL	REQUIRED				XD, ZP	
	NOT REQUIRED				ZO	
EXTENDED REMOTE TESTING	WITH RANGE EXTENSION FOR UNIGAUGE	NO.5 CSBR OFFICE			ZT, ZQ, ZM, ZS, XF, XJ, XL	
		NO.2 ESS OFFICE		7	ZQ, ZS, XF, XJ, XL	1 PER CKT SEE NOTE 111, 112
	WITHOUT RANGE EXTENSION FOR UNIGAUGE	NO. 5 CSBR OFFICE			ZQ, ZU, ZX, XF, XL	
		ALL OTHER OFFICES			ZQ, ZU, ZY, XF, XL	
NIGHT TEST COVERAGE	PROVIDED AND USING (SEE NOTE 314)	NON-DEDICATED FACILITIES FOR DAY & NIGHT OFFICES			XH, YC, YJ *	
		DEDICATED FACILITIES FOR DAY & NIGHT OFFICES			XH, YC, YH *, YI *	
		DEDICATED DAY & NON-DEDICATED NIGHT OFFICES		8	XH, YC, YI *	
	NOT PROVIDED AND USING	NON-DEDICATED FACILITIES			YB	
		DEDICATED FACILITIES			YB, YH *	
SUBSCRIBER REL TST OR CONT TST TO RNGR ISOLATOR OR RING EXTENDER SEE NOTE 104, 114)	REQUIRED				YO, YX	
	NOT REQD				YP, YW	
MDF TELEPHONE AND LOUDSPEAKER	REQUIRED			9	YS	
	NOT REQUIRED				YT	
PERMANENT SIGNAL HOLDING TRUNK IDENTIFICATION (CROSSBAR ONLY)	REQUIRED				YV	
	NOT REQUIRED				YU	
WHEN MOUNTED IN A NO. 3 ESS OFFICE					XM	

* NONRECORD OPTION

CIRCUIT NOTES (CONT)

103.

NETWORK VALUES		
NETWORK NO.	RESISTANCE IN OHMS	CAPACITANCE IN UF
1	470	0.11
2 (14 NETWORKS)	470	0.5
2	150	0.5

CIRCUIT NOTES (CONT)

104.

RECORD OF APP FIGURES, WIRING AND APPARATUS CHANGES

CHANGED ON ISS	IF JCB RECORDS DO NOT SPECIFY	THIS OPTION WAS FURN	SEE NOTE	USE IN CIRCUIT: STD	ABM	MD
			102	APP FIG 6		
6B	T	NONE	102	T		
	R	S	102	S,R		
8AC	Q OR K	K OR K,B,Z	102	Q,Z		K
9B		M	102	M,N		
10B	H OR J	J OR NONE	105	H,J		
	G	NONE		G		
	E OR F	F	106	E		F
	A OR B	B	107	A		B
	ZA OR ZB	ZA		ZB		ZA
	ZC OR ZD	ZC		ZD		ZC
	ZE OR ZF	ZE		ZF		ZE
	ZG OR ZH	ZG		ZH	ZG	
12B	ZI OR ZJ	ZI OR NONE	109	ZI, ZJ		
	ZK OR ZL	ZK		ZL		ZK
	ZM OR ZN	ZM OR NONE	102, 110	ZM, ZN		
	ZO OR ZP	ZO	102	ZO, ZP		
15D	APP FIG 7	NONE	102	APP FIG. 7		
	ZQ OR ZR	ZR & N OR ZR & NONE	102, 111	ZQ, ZR		
	ZS	N OR NONE	102	ZS		
	ZT OR ZU	M OR NONE	102	ZT, ZU		M
	ZV OR ZW	ZV		ZW		ZV
	ZZ OR YA	ZZ	112	YA		ZZ
	ZY OR ZX	XJ OR ZT	102	ZX, ZY		
	YB OR YC, APP FIG. 8	YB	102	YB, YC, APP FIG. 8		
	YH, YI, OR YJ	NONE	102, 312	YH, YI, YJ		
	YD, YE, YK, YL OR YM	NONE	102, 314	YD, YE, YK, YL, YM		
	YG OR YF	YF & Z OR YF & C	313	YG		Q, Z, YF
	YN, YO OR YP	YN	102, 113	YO, YP		YN
	YQ OR YR	R OR S	102	YQ, YR		R, S
16D	YS OR YT	YT	102	YS, YT		
16D	YU OR YV	YU		YU, YV		
17B	YW OR YX	YW	114	YW, YX		
18B	YY OR YZ	YY	115	YZ		YY
19AC	XA OR XB	YY OR YZ	116	XB		YZ, XA
	XC OR XD	ZP, XC	102	XD		XC
	XE OR XF	ZQ, XE		XF		XE
	XG OR XH	YC, XG		XH		XG
	XI, XJ, ZJ, ZN	XI, ZJ OR ZN	102 109	XI, XJ		ZJ, ZN
	XK OR XL	XK OR NONE	102	XK, XL		
20B	XM	NONE	102	XM		

CIRCUIT NOTES CONTINUED ON SHEET D1B.

ISSUE 208 HW

REMOTE TESTING CIRCUIT - FAR END (2) SD-99 11-01-D1A

BELL TELEPHONE LABORATORIES INCORPORATED 6S

SD-99311-01-D1A

CIRCUIT NOTES (CONT)

105. OPTION "H" WAS ADDED ON ISSUE 10B TO PERMIT TESTING OF DIAL TONE FIRST COIN TELEPHONES. OPTION "H" ALLOWS TESTING OF COIN FIRST STATIONS ALSO. IT SHOULD BE NOTED THAT THE DIAL TONE FIRST COIN COLLECT AND RETURN FEATURE MAY BE MARGINAL WHEN USED TO TEST COIN STATIONS IN COIN FIRST AREAS WHERE GENERAL SERVICE REQUIRES 6B5B SUBSETS EQUIPPED WITH 3-36 RELAYS TO BE USED WITH P-145749 COIN RELAYS.

106. OPTION "E" WAS ADDED ON ISSUE 10B TO PERMIT BALLISTIC TEST TO BE DONE WITH RCCI KEY. THIS FEATURE REQUIRES THE USE OF OPTION "A" TO MAKE A RELAY AVAILABLE.

107. OPTION "A" WAS ADDED ON ISSUE 10B TO SIMPLIFY THE RELEASE OF RINGING RELAYS IT MAKES THREE HALVES OF AK RELAY SPARE. SEE NOTE 106

MFR DISC

108. IN NO 2 ESS OFFICES WHERE RANGE EXTENSION FOR UNIGAUGE IS NOT PROVIDED, USE RINGING LEADS SUP +, SUP −, OR IF ONLY AC-DC RINGING IS PROVIDED USE OPTION ZN.

109. ON ISSUE 12B OPTIONS "ZT" AND "ZJ" WERE ADDED. PREVIOUSLY PART OF OPTION "ZT" WAS INCLUDED IN OPTION "N. OPTION "ZJ" OR "XJ" REQUIRES USE OF OPTIONS "A" AND "ZL".

110. ON ISSUE 12B OPTION "ZM" WAS DESIGNATED PRIOR TO THIS ISSUE IT WAS PART OF OPTION "N."

111. TEST VOLTAGES +STA AND −STA ARE REQUIRED FOR EXTENDED REMOTE TESTING (WIRING OPTION ZQL) THESE VOLTAGES CAN BE OBTAINED FROM APP FIG 5 AND OPTION W, OR APP FIG 6 AND OPTION W, OR FROM THE REGULATED COIN CONTROL SUPPLY AND OPTION V.

112. ON ISSUE 15D OPTION YA WAS DESIGNATED AND RATED STD, AND OPTION ZZ WAS DESIGNATED AND RATED MD TO PERMIT EXTENDED REMOTE TESTING.

113. PRIOR TO ISSUE 15D, THE SUBSCRIBER RELAY TEST CIRCUITRY WAS ALWAYS PROVIDED WITH THIS CIRCUIT.

114. TO MODIFY EXISTING POSITION FOR CONTINUITY TESTING FROM TEST DESK TO RNGR ISOLATOR OR IIA RINGING EXTENDER AT STATION, MODIFY FROM OPTION YW TO YX. IN ADDITION, OPTION YM OR YO IS REQUIRED

115. OPTION YZ PROVIDES THE DIAL ON SUBSCRIBER LINE FEATURE FOR USE ON DIAL ACCESS TRUNKS IN STEP BY STEP AND PANEL OFFICES AND FOR SHOE ACCESS IN CROSSBAR AND ESS OFFICES.

116. PRIOR TO ISSUE 19AC THE DIAL-ON SUBSCRIBER LINE FEATURE WAS PROVIDED BY OPTION "YZ". OPTION "YZ" IS NOW RATED (MFR DISC) AND REPLACED BY OPTION "XB".

EQUIPMENT NOTES:

201. TO INSURE PROPER OPERATION OF SD-93311-01, THE J93016CH, J93016CJ AND J93016CK UNITS SHALL BE MOUNTED ON THE SAME BAY.

202. FOR FIELD MAINTENANCE AFTER ISSUE 7A, REPLACING ANY OF THE ED-99669-(30), ED-99670-(30), ED-99671-(30), OR ED-99672-(30) CIRCUIT PACKS WITH A NEW AA5, AA6, AA7 OR AA8 CIRCUIT PACK REQUIRES THAT ALL FOUR PACKS BE CHANGED TO THE AA5 THRU AA8 CIRCUIT PACKS.

203. THE NOMINAL VALUES IN CPS 2 FOR R145 IS R146 AND IN CPS 3,4,8,5 FOR 206 A,B,C, R211 A,B,C, R215 A,B,C AND R219 A,B,C REPLACE NOMINAL VALUES ARE NE WITH 56,300 OHMS TO READJUST WIDE BANDWIDTHS AND 49,300 OHMS TO READJUST NARROW BANDWIDTHS TO WITHIN MANUFACTURING TESTING REQUIREMENTS.

INFORMATION NOTES:

301. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS,
CAPACITANCE VALUES ARE IN MICROFARADS,
VALUES PRECEDED BY THE SYMBOL + (PLUS) OR − (MINUS) ARE IN VOLTS.

302. MEASURED ACROSS 20V, 50V, 100V, +116V AND −116V TERMINALS WITH VOLTMETER OF A SENSITIVITY OF NOT LESS THAN 1000 OHMS PER VOLT

SUPPLY	RELAYS BLOCKED OPERATE	MIN	MAX
20V	VR,MA	18V	21V (AFTER 10 SEC DRAIN)
50V	VR,60P	49V	51V
100V	VR	99V	101V
+116V	VR, +STA	116V	119V (AFTER 5 SEC DRAIN)
−116	VR, −STA		

INFORMATION NOTES CONTINUED ON SHEET 2B2.

ISSUE 19AC HW

REMOTE TESTING CIRCUIT - FAR END (2)

SD-93311-01-DIB

BELL TELEPHONE LABORATORIES 65

SD-93311-01-DIB

INFORMATION NOTES: CONTINUED

303.

TABLE A

MULTITONE FREQUENCY CODE ASSIGNMENT

R TERM & LEAD NO.	REG REL	$R_{OPERATE}$ CODE A-	B-	C-	LTD KEYS
1		A1	B1	C1	
2	TD	A1	B2	C1	TD
3		A1	B3	C1	
4	TS	A1	B4	C1	TTS
5	DL	A1	B5	C1	DIAL
6	CT	A2	B1	C1	CT
7	RG	A2	B2	C1	RG
8	RDM	A2	B3	C1	M
9	F	A2	B4	C1	FEMF
10	MA	A2	B5	C1	24MA
11	60V	A3	B1	C1	60V
12	MDF	A3	B2	C1	MDF
13	IN	A3	B3	C1	IN
14		A3	B4	C1	
15	VR	A3	B5	C1	VMREV
16	-T	A4	B1	C1	-T
17	-R	A4	B2	C1	-R
18		A4	B3	C1	
19	C	A4	B4	C1	G
20		A4	B5	C1	
21	M	A5	B1	C1	M
22	RVM	A5	B2	C1	REV
23	3WD	A5	B3	C1	3WD
24	KP	A5	B4	C1	KP
25	TK	A5	B5	C1	T

R TERM & LEAD NO.	REG REL	$R_{RESTORE}$ CODE A-	B-	C-	LTD KEYS
26		A1	B1	C2	
27	TDR	A1	B2	C2	TD
28		A1	B3	C2	
29	TSR	A1	B4	C2	TTS
30		A1	B5	C2	
31	CTR	A2	B1	C2	CT
32	RGR	A2	B2	C2	RG
33	RDMR	A2	B3	C2	M
34	FR	A2	B4	C2	FEMF
35	MAR	A2	B5	C2	24MA
36	60VR	A3	B1	C2	60V
37	MDFR	A3	B2	C2	MDF
38	INR	A3	B3	C2	IM
39		A3	B4	C2	
40	VRR	A3	B5	C2	VMREV
41	-TR	A4	B1	C2	-T
42	-RR	A4	B2	C2	-R
43		A4	B3	C2	
44	GR	A4	B4	C2	G
45		A4	B5	C2	
46	MR	A5	B1	C2	M
47	RVMR	A5	B2	C2	REV
48	3WDR	A5	B3	C2	3WD
49	KPR	A5	B4	C2	KP
50	TKR	A5	B5	C2	T

R TERM & LEAD NO.	REG REL	$R_{OPERATE}$ CODE A-	B-	C-	LTD KEYS
51	NT	A1	B1	C3	NT
52	TT	A1	B2	C3	TT
53	SRT	A1	B3	C3	SSRT
54	+T	A1	B4	C3	+T
55	+R	A1	B5	C3	+R
56		A2	B1	C3	
57	CC	A2	B2	C3	CC
58	CN	A2	B3	C3	CR
59	+STA	A2	B4	C3	+STA
60	-STA	A2	B5	C3	-STA
61		A3	B1	C3	
62		A3	B2	C3	
63		A3	B3	C3	
64	TF	A3	B4	C3	NC
65		A3	B5	C3	
66	REY	A4	B1	C3	
67		A4	B2	C3	
68	LS	A4	B3	C3	RTLS
69	ERT	A4	B4	C3	ERT
70		A4	B5	C3	
71	RCCI	A5	B1	C3	RCCI
72	PR	A5	B2	C3	PSRLS
73	LRP	A5	B3	C3	LRP
74	--	A5	B4	C3	
75	ANS/ST	A5	B5	C3	--

R TERM & LEAD NO.	REG REL	$R_{RESTORE}$ CODE A-	B-	C-	LTD KEYS
76	NTR	A1	B1	C4	NT
77	TTR	A1	B2	C4	TT
78	SRTR	A1	B3	C4	SSRT
79	+TR	A1	B4	C4	+T
80	+RR	A1	B5	C4	+R
81		A2	B1	C4	
82	CCR	A2	B2	C4	CC
83	CRR	A2	B3	C4	CR
84	+STRR	A2	B4	C4	+STA
85	-STRR	A2	B5	C4	-STA
86		A3	B1	C4	
87		A3	B2	C4	
88		A3	B3	C4	
89	TFR	A3	B4	C4	NC
90		A3	B5	C4	
91	REXR	A4	B1	C4	
92		A4	B2	C4	
93	LSR	A4	B3	C4	RTLS
94	ERTR	A4	B4	C4	ERT
95		A4	B5	C4	
96	RCPR	A5	B1	C4	RCCI
97	PRR	A5	B2	C4	PSRLS
98	LRPR	A5	B3	C4	LRP
99	DIS	A5	B4	C4	DIS
100	STR	A5	B5	C4	-

^{R}A-, B-, AND C- REFER TO TRANSLATOR RELAYS AND ASSOCIATED OPERATING LEADS.

THE CORRESPONDING FREQUENCIES ARE:

A1 = 600~	B1 = 1098~ C1 = 1950~
A2 = 697~	B2 = 1209~ C2 = 2059~
A3 = 770~	B3 = 1336~ C3 = 2150~
A4 = 852~	B4 = 1477~ C4 = 2250~
A5 = 941~	B5 = 1633~

304. THE -34 VOLTS SHOULD BE ADJUSTED WITH THE (ADJ) POTENTIOMETER TO -34.0 ±0.1 VOLTS.

305. TO ADJUST GAIN OF (AMP) AMPLIFIER AND LEVEL OF (SC) OSCILLATOR WITH (ON) AND (CN1) RELAYS, OPERATED INSERT 900 OHMS, WITH VACUUM TUBE VOLTMETER ACROSS IT INTO (HYL) JACK. ADJUST AMP GAIN TO MEASURE -6 DBM (480MV RMS). OPERATE (SD) RELAY AND ADJUST (SO) POTENTIOMETER TO READ -6 DBM (480MV RMS).

306. TO ADJUST (CCO) OSCILLATOR CONNECT 72A METER TO (HYL) JACK. OPERATE (ON) AND (CN1) RELAYS. ADJUST ZERO POTENTIOMETER TO INDICATE 1100 ±1 HZ. OPERATE RELAY (VR) AND ADJUST (SENS) POTENTIOMETER TO INDICATE 1517 Hz. OPERATE RELAY (VRR) TO RELEASE RELAY (VR). REPEAT ADJUSTMENTS OF (ZERO) AND (SENS) POTENTIOMETER UNTIL 1100Hz ±1Hz IS INDICATED WHILE (VR) IS RELEASED AND 1517Hz ±1Hz IS INDICATED WHILE (VR) IS OPERATED.

307. TO ADJUST GAIN OF (M) AMPLIFIER CONNECT 72A OSCILLATOR INTO (TJ1) JACK. CONNECT 900 OHMS AND VACUUM TUBE VOLTMETER INTO (HYL) JACK. OPERATE (ON), (CN1) AND (TF) RELAYS AND ADJUST 72A SIGNAL LEVEL SO THAT VOLTMETER READS -5 DBM. OPERATE (M) RELAY. ADJUST (M) AMPLIFIER SO THAT VOLTMETER STILL READS -5 DBM.

308. TO ADJUST (H) POTENTIOMETER INSERT 900 OHMS INTO (HYL) JACK. INSERT 600 OHMS WITH VACUUM TUBE VOLTMETER INTO (HYD) JACK. OPERATE (ON), (CN1) AND (CN2) RELAYS. ADJUST (H) POTENTIOMETER FOR MINIMAL READING ON VOLTMETER.

309. TO CHECK FREQUENCY OF (SO) OSCILLATOR INSERT 72A METER INTO (HYL) JACK. OPERATE (ON), (CN1) AND (SO) RELAYS. THE 72A METER SHOULD READ 1017 ±1 HZ. IF NOT IT CAN BE ADJUSTED BY VARYING THE SLUG OF TRANSFORMER (T1).

310. TO ADJUST THE GAIN OF THE 2-WAY AMPLIFIER (FSIB), CONNECT A 72A OSCILLATOR INTO JACK (HYL). CONNECT A VACUUM TUBE VOLTMETER, WITH 900 OHMS IN PARALLEL, AT THE (TJ1) JACK. OPERATE RELAYS (ON),(ON2) AND (TK), AND ADJUST THE OSCILLATOR SO THAT THE VOLTMETER READS -5DBM. OPERATE RELAY (REX) AND ADJUST (AMP2) FOR A METER READING OF 0 DBM. REVERSE THE OSCILLATOR AND METER, AND REPEAT THE ABOVE PROCEDURE ADJUSTING (AMP1). REPEAT UNTIL BOTH AMPLIFIERS READ 0 DBM.

INFORMATION NOTES: (CONT)

311. THE TIMING CYCLE OF THE (TF) TIMER MAY BE CHECKED USING A WATCH BY MANUALLY OPERATING (TF) RELAY AND OBSERVING THAT (TF1) RELAY OPERATES IN APPROXIMATELY 2 TO 3 SECONDS.

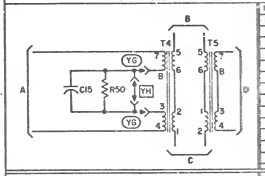
312. OFFICE JOB RECORDS NEED NOT BE MAINTAINED FOR YH, YI & YJ OPTIONS.

313. PRIOR TO ISSUE 150, OPTION Q WAS PROVIDED WITH APP FIG 1, 2 & 3 WHEN NON-DEDICATED FACILITIES WERE USED, WHILE OPTION Z WAS PROVIDED WHEN DEDICATED FACILITIES WERE USED. ON ISSUE 150, OPTIONS Q AND Z WERE RATED MFR DISC. AND REPLACED BY OPTION YG

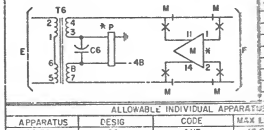
314. WHEN THIS CIRCUIT IS ARRANGED FOR DEDICATED DAY & NIGHT OR DEDICATED DAY & NON-DEDICATED NIGHT SERVICE, PROVIDE BUSY TONE AS FOLLOWS:

SYSTEM	OPTION
FSS	YE
SXS NON-PRECISE TONE	YK
SXS PRECISE TONE	YL
CSBR NON-PRECISE TONE	YD,YM
CSBR PRECISE TONE	YD,YK
PANEL	YD,YK

TRANSMISSION TEST REQUIREMENTS
(1kHz LOSS BETWEEN 600 OHM TERMINATIONS)



	MAXIMUM ALLOWABLE CKT LOSS (dB)
A TO B	9.0
A TO C	5.0



	MAXIMUM ALLOWABLE CKT LOSS (dB)
E TO F	0.3

ALLOWABLE INDIVIDUAL APPARATUS LOSSES (dB)

APPARATUS	DESIG	CODE	MAX LOSS	MIN LOSS	REMARKS
CAPACITOR	C6	4UF	19.5	17.4	TEST IN SHUNT
CAPACITOR	C15	4UF	18.8	16.1	TEST IN SHUNT
REPEATING COIL	T4,T5	120J	.4		
REPEATING COIL	T6	120K	.4		
RESISTOR	R50	18AH	5.2	5.0	

* APPARATUS FOR WHICH INDIVIDUAL LOSSES ARE NOT REQUIRED

CROSS CONNECTION INFORMATION NOTES:

401. PAIRED LEADS LGI-LG2, ST-HR/RV, TT/TD-NT/MDF, ST/MDFT-LL/XIN ARE MULTIPLED TO A MAXIMUM OF TEN EXTENDED OFFICES (SEE FS17).

ISSUE	
3A	WC AR
40	AC AR
68	SC AR
74	
98	
108	

ISSUE 19AC HW

REMOTE TESTING CIRCUIT - FAR END

SD-99303-01-D2

BELL TELEPHONE LABORATORIES INCORPORATED

6S

PRINTED IN U.S.A.

SD-99303-01-D2

CROSS-CONNECTION INFORMATION:

402.

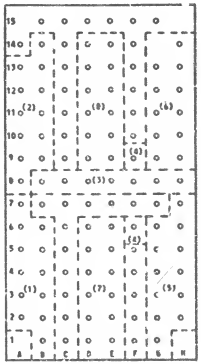


FIG. 1

UNIT TS FOR 426 DIAL

A. USE FIG. 2 WHEN THE LTD INCOMING REMOTE TESTING CIRCUIT IS ASSOCIATED WITH ONE NO. 14 LTD.

1. ASSUME THAT THE TELEPHONE NUMBER TO BE ASSIGNED TO THE LTD IS 765-9950.

2. THE TERMINALS SHOWN IN BLOCKS (1), (2), (3) AND (4) OF FIG. 2 ARE THOSE IN THE AREAS OF LIKE DESIGNATION IN FIG. 1.

3. THE ASSIGNED TELEPHONE NUMBER IS SEQUENTIALLY ASSOCIATED WITH THE LOWER AND UPPER SCAN SECTION SEGMENTS IN BLOCKS (1) AND (2). CROSS CONNECTION PATHS (A) AND (E) INDICATE THAT THE BRUSH TERMINALS - BLOCK (3) - ARE ASSOCIATED WITH THE LOWER AND UPPER SCAN SEGMENTS - BLOCKS (1) AND (2).

a. CROSS CONNECT THE TELEPHONE NUMBER 765-9950 AS FOLLOWS:

FROM LOWER SCAN SECTION		TO BRUSH	
SEGMENT	TERMINAL	TERMINAL	DIGIT
1	A2	B8	7
2	A3	B8	6
3	A4	C8	5
4	A5	B5	9
5	A6	B8	9
6	A7	C8	5
7	A1	C5	0

NOTE: SEGMENT TERMINALS THAT USE THE SAME BRUSH TERMINAL SHOULD BE STRAPPED AS FOLLOWS:

FIRST MULTIPLE STRAP A3, A5 AND A6
SECOND MULTIPLE STRAP A4, A7 AND A1

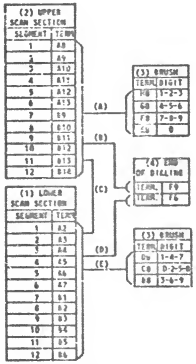


FIG. 2

3. (CONT)

FROM UPPER SCAN SECTION		TO BRUSH	
SEGMENT	TERMINAL	TERMINAL	DIGIT
1	A8	F8	7
2	A9	G8	6
3	A10	G8	5
4	A11	F8	9
5	A12	F8	9
6	A13	G8	5
7	B9	E8	0

NOTE: SEGMENT TERMINALS THAT USE THE SAME BRUSH TERMINAL SHOULD BE STRAPPED AS FOLLOWS:

FIRST MULTIPLE STRAP A8, A11 AND A12
SECOND MULTIPLE STRAP A9, B10 AND A13

4. END OF DIALING CROSS CONNECTIONS - PATH (D) AND (E), MUST BE INSTALLED ON SEGMENT TERMINAL 6 OF THE LOWER AND UPPER SCAN SECTIONS TO THE END OF DIALING TERMINALS IN IN BLOCK (4).

5. THE UNUSED SEGMENT TERMINALS OF THE LOWER AND UPPER SCAN SECTIONS SHALL BE STRAPPED TOGETHER - PATH (C).

B. USE FIG. 3 WHEN THE LTD INCOMING REMOTE TESTING CIRCUIT IS ASSOCIATED WITH TWO NO. 14 LOCAL TEST DESKS SHALL BE CROSS CONNECTED PER FIG. 3.

1. THE TERMINALS IN BLOCKS (5) AND (6) ARE ASSOCIATED WITH THE REGULAR TEST DESK AND THE TERMINALS IN BLOCKS (7) AND (8) ARE ASSOCIATED WITH THE SECOND OR ALTERNATE TEST DESK.

2. THE CROSS CONNECTIONS FOR FIG. 3 SHALL BE INSTALLED IN THE SAME MANNER AS THOSE IN FIG. 2.

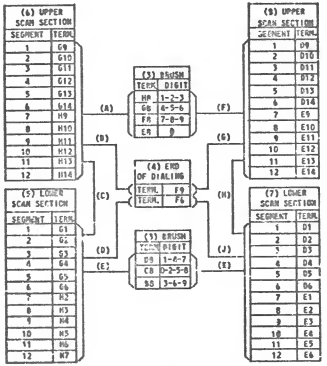
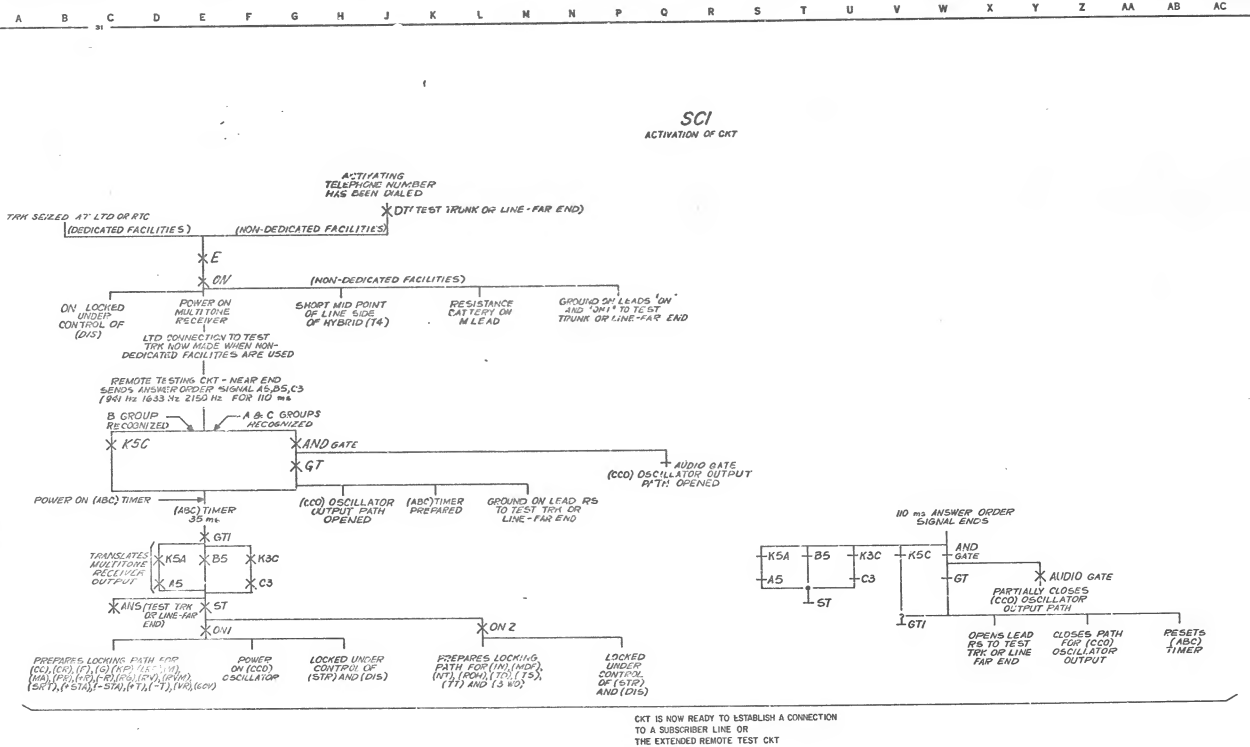


FIG. 3

SD-99311-01-D3

COMMON SYSTEMS	
LOCAL TEST DESK INCOMING REMOTE TESTING CIRCUIT - REMOTE END	SD-99311-01-D3
BELL TELEPHONE LABORATORIES INCORPORATED	65



DRAWING ISSUE 19AC

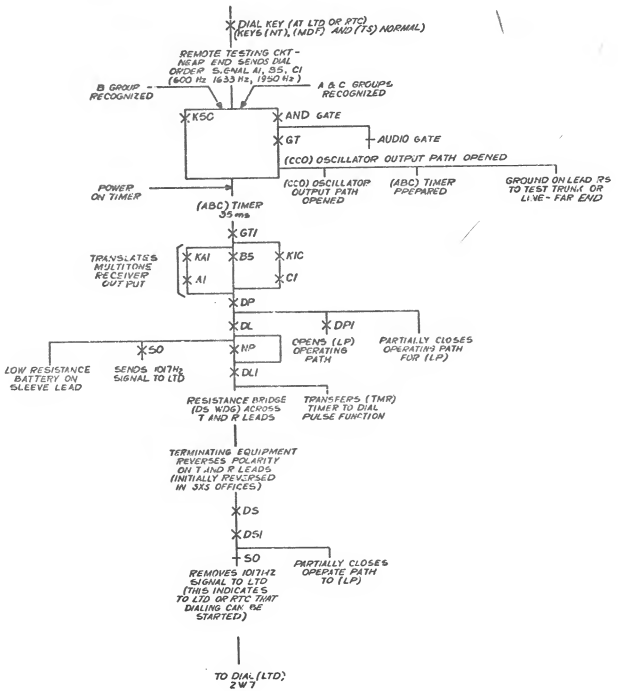
REMOTE TESTING CIRCUIT - FAR END (2) SD-99511-01-01

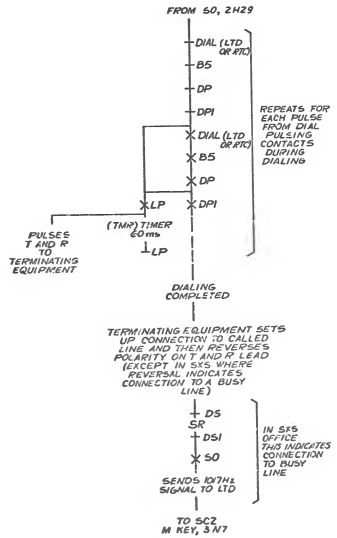
BELL TELEPHONE LABORATORIES INCORPORATED 6S

SD-99511-01

PART OF SC2

ESTABLISHING A TEST CONNECTION TO A SUBSCRIBER LINE (DP TERMINATING EQUIPMENT)





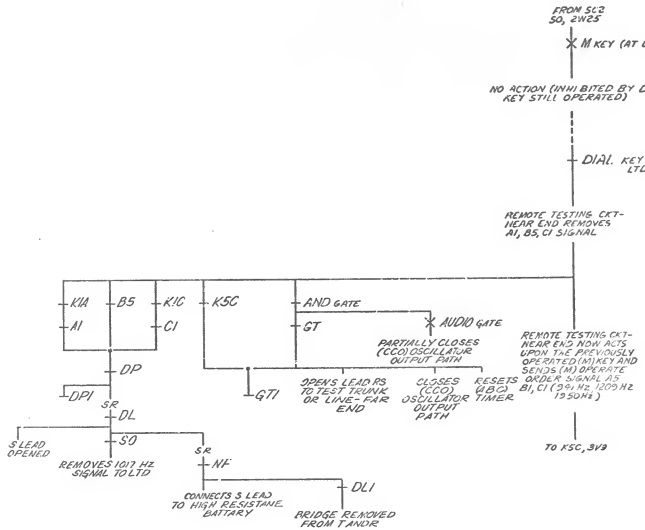
10

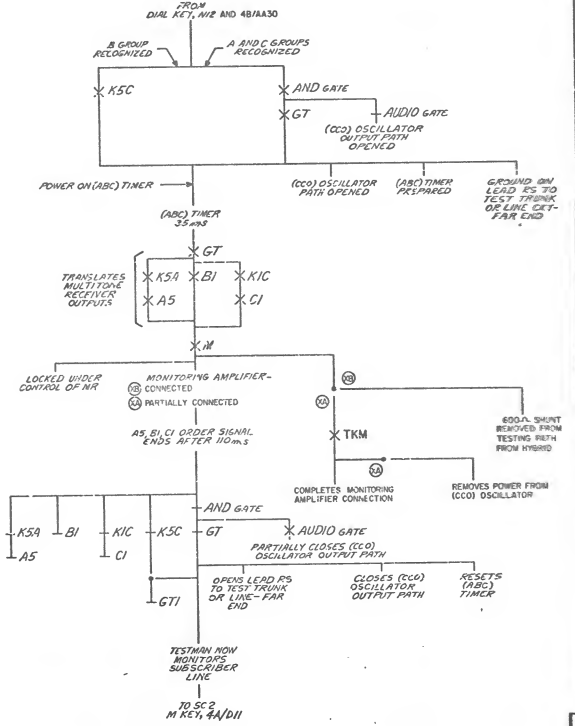
REMOTE TESTING CIRCUIT - FAR END (?)	SD-99311-01-C2
BELL TELEPHONE LABORATORIES INCORPORATED	DRAWING 6S

SD-99301-02

PART OF SC2

ESTABLISHING A TEST CONNECTION TO A SUBSCRIBER LINE (OF TERMINATING EQUIPMENT)





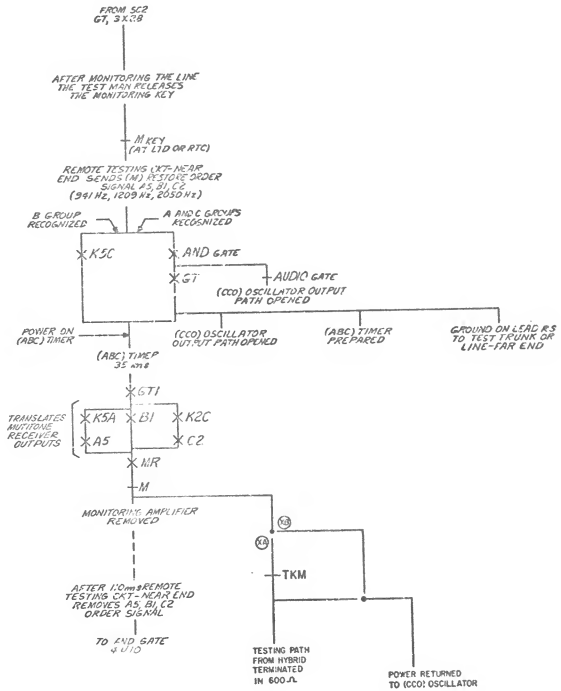
ISSUE 19AC

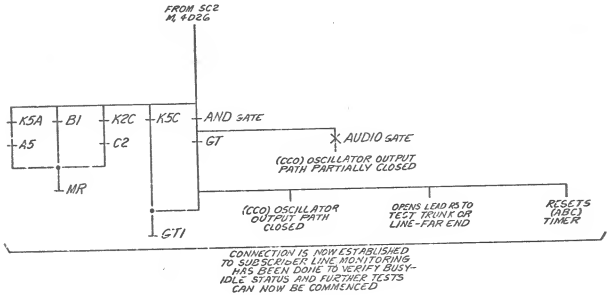
REMOTE TESTING CIRCUIT - FAR END	SD-99311-01-E3
BELL TELEPHONE LABORATORIES INCORPORATED	SHEET 65

SD-99311-01-E3

PART OF SC2

ESTABLISHING A TEST CONNECTION TO A SUBSCRIBER LINE (OR TERMINATING EQUIPMENT)





DRAWING ISSUE 103

ISSUE 19AC

REMOTE TESTING CIRCUIT - FAR END

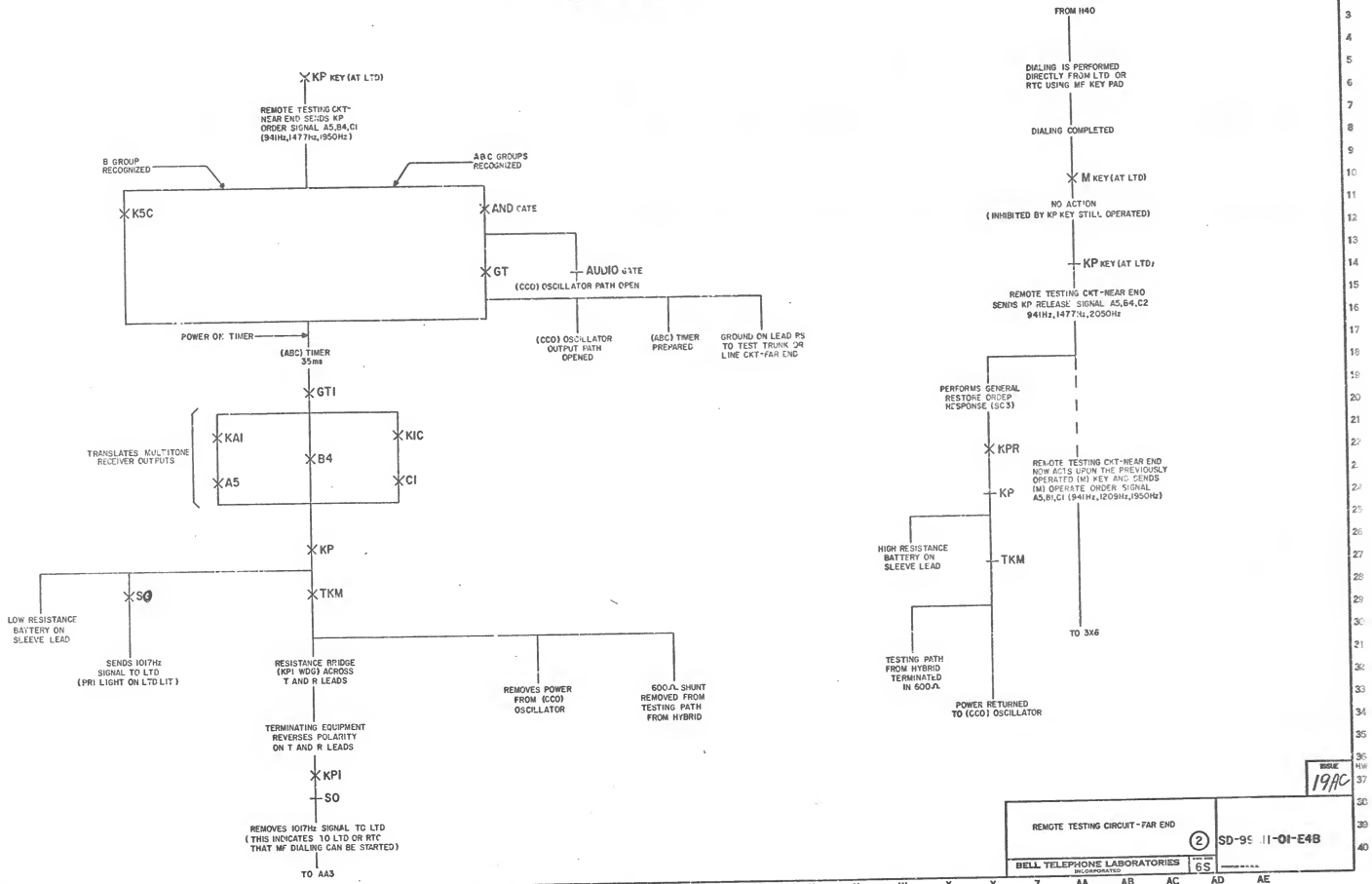
BELL TELEPHONE LABORATORIES INCORPORATED 65

SL 9 311-01-E4A

SD-99311-01-E4A

PART OF SC2

ESTABLISHING A TEST CONNECTION TO A SUBSCRIBER LINE (MF TERMINATING EQUIPMENT)



ISSUE 19AC

REMOTE TESTING CIRCUIT-FAR END

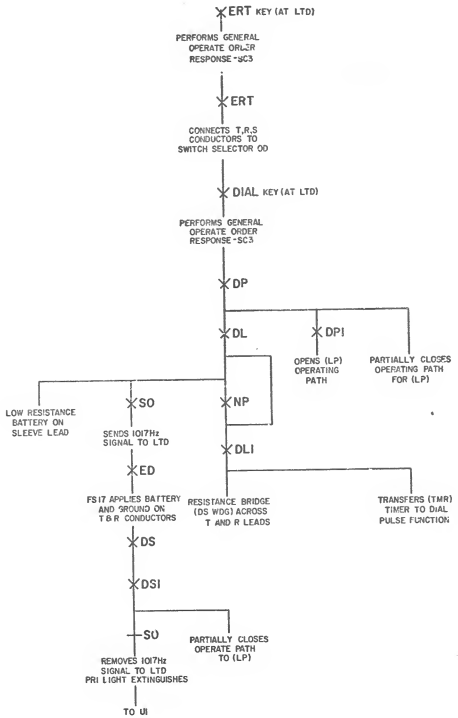
(2) SD-99 11-01-E4B

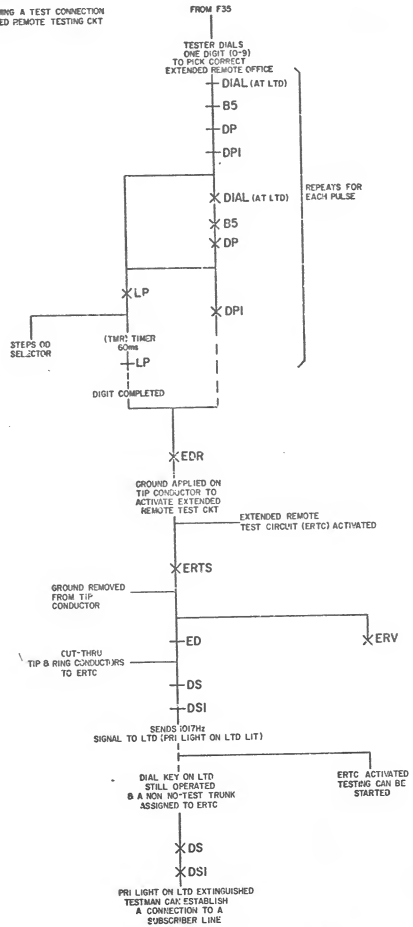
BELL TELEPHONE LABORATORIES INCORPORATED

6S

SC2A

ESTABLISHING A TEST CONNECTION TO EXTENDED REMOTE TESTING CKT





ISSUE 19AC

REMOTE TESTING CIRCUIT-FAR END

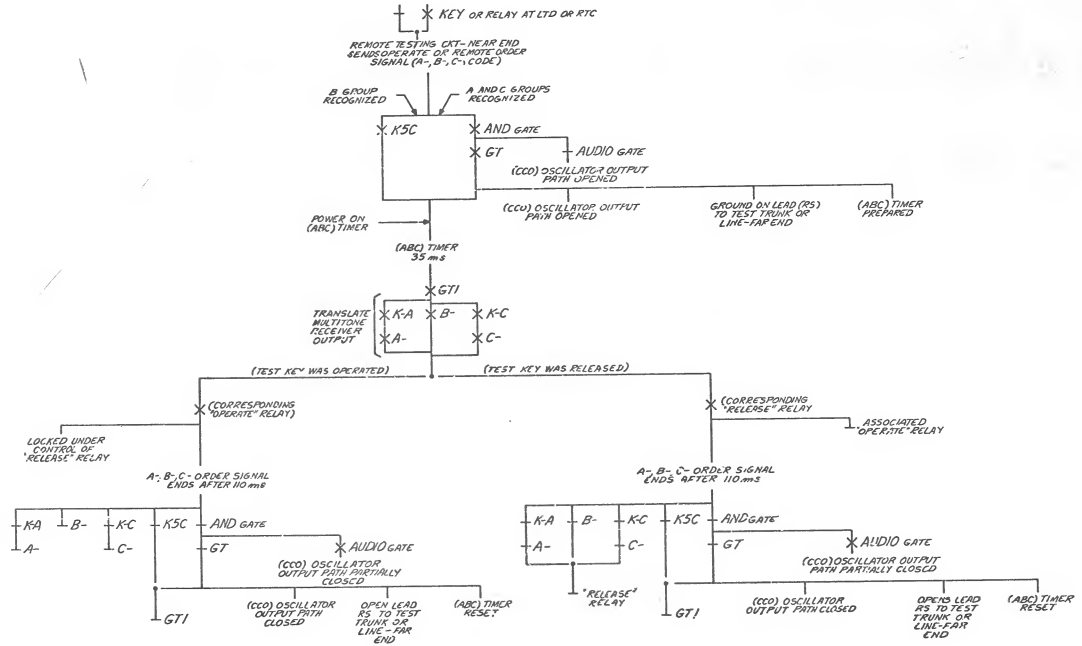
BELL TELEPHONE LABORATORIES INCORPORATED

(2) SD-5 5 -01-E4C

SS

SC3

GENERAL OPERATE AND RESTORE ORDER RESPONSE



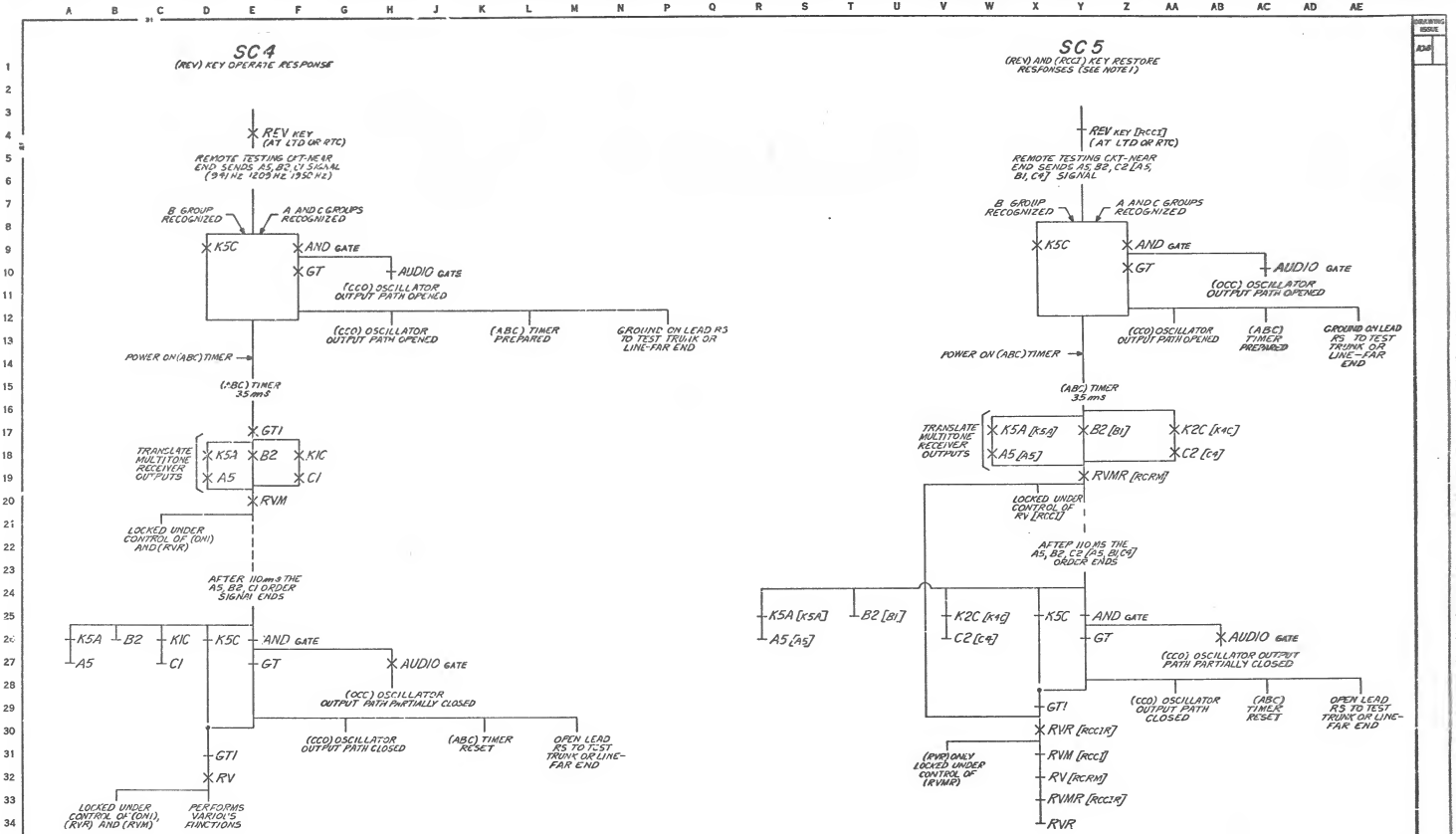
DRAWING ISSUE AOB

10

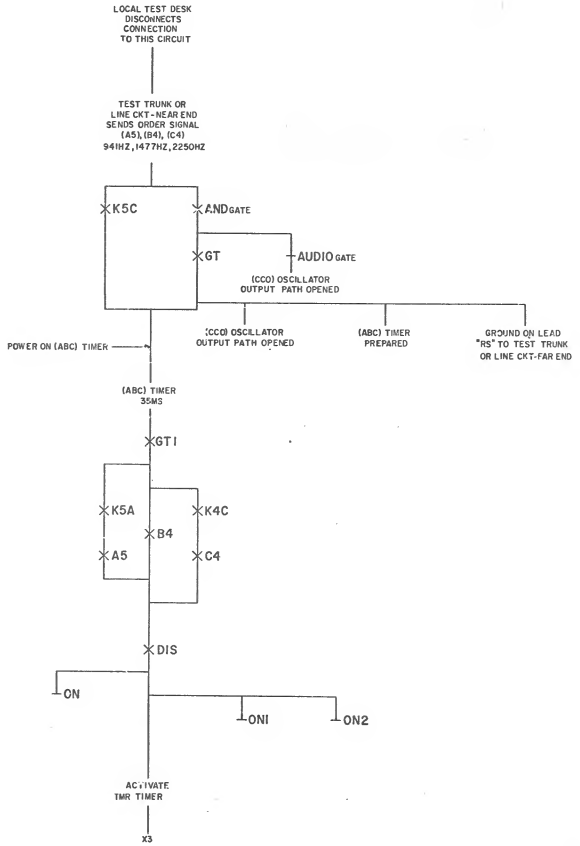
REMOTE TESTING CIRCUIT - FAR END (2) SD-99311-01-ES

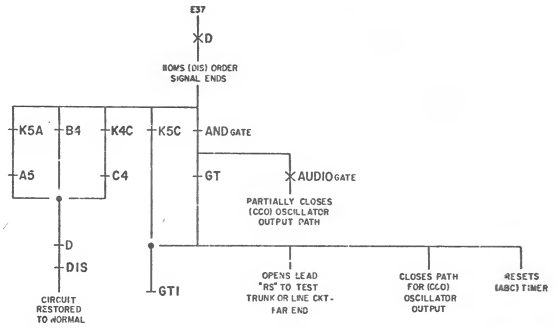
BELL TELEPHONE LABORATORIES INCORPORATED SHEET 65

SD-99311-01-ES


SC4
(REV) KEY OPERATE RESPONSE
REV KEY (AT LTD OR RTC)
REMOTE TESTING CKT-NEAR END SENDS A5, B2, C1 SIGNAL (391 Hz 1209 Hz 1552 Hz)
B GROUP RECOGNIZED
A AND C GROUPS RECOGNIZED
K5C
AND GATE
GT
AUDIO GATE
(CCO) OSCILLATOR OUTPUT PATH OPENED
(CCO) OSCILLATOR OUTPUT PATH OPENED
(ABC) TIMER PREPARED
GROUND ON LEAD R3 TO TEST TRUNK OR LINE-FAR END
POWER ON (ABC) TIMER
(ABC) TIMER 35 ms
GT1
TRANSLATE MULTITONE RECEIVER OUTPUTS
K5A
B2
K1C
A5
C1
RVM
LOCKED UNDER CONTROL OF (ONI) AND (RVR)
AFTER 110 ms THE A5, B2, C1 ORDER SIGNAL ENDS
K5A
A5
B2
K1C
C1
K5C
AND GATE
GT
AUDIO GATE
(OCC) OSCILLATOR OUTPUT PATH PARTIALLY CLOSED
(CCO) OSCILLATOR OUTPUT PATH CLOSED
(ABC) TIMER RESET
OPEN LEAD R5 TO TEST TRUNK OR LINE-FAR END
GT1
RV
LOCKED UNDER CONTROL OF (ONI), (RVR) AND (RVM)
PERFORMS VARIOUS FUNCTIONS
SC5
(REV) AND (RCCI) KEY RESTORE RESPONSES (SEE NOTE 1)
REV KEY [RCCI] (AT LTD OR RTC)
REMOTE TESTING CKT-NEAR END SENDS A5, B2, C2 [A5, B1, C4] SIGNAL
B GROUP RECOGNIZED
A AND C GROUPS RECOGNIZED
K5C
AND GATE
GT
AUDIO GATE
(OCC) OSCILLATOR OUTPUT PATH OPENED
(CCO) OSCILLATOR OUTPUT PATH OPENED
(ABC) TIMER PREPARED
GROUND ON LEAD R5 TO TEST TRUNK OR LINE-FAR END
POWER ON (ABC) TIMER
(ABC) TIMER 35 ms
TRANSLATE MULTITONE RECEIVER OUTPUTS
K5A [K5A]
B2 [B1]
K2C [K4C]
A5 [A5]
C2 [C4]
RVMR [RCRM]
LOCKED UNDER CONTROL OF RV [RCCI]
AFTER 110 MS THE A5, B2, C2 [A5, B1, C4] ORDER ENDS
K5A [K5A]
A5 [A5]
B2 [B1]
K2C [K4C]
C2 [C4]
K5C
AND GATE
GT
AUDIO GATE
(CCO) OSCILLATOR OUTPUT PATH PARTIALLY CLOSED
(CCO) OSCILLATOR OUTPUT PATH CLOSED
(ABC) TIMER RESET
OPEN LEAD R5 TO TEST TRUNK OR LINE-FAR END
GT1
RVR [RCCIR]
RVM [RCC]
RV [RCRM]
RVMR [RCCIR]
RVR
(RVR) ONLY LOCKED UNDER CONTROL OF (RVMR)
NOTES:
1. WHERE DUAL DESIGNATIONS THOSE IN BRACKETS ARE FOR (RCCI) KEY AND OTHERS ARE FOR (REV) KEY OPERATIONS.
ISSUING ISSUE
ASB
10
/ REMOTE TESTING CIRCUIT - FAR END
SD- 99311-01-E6
BELL TELEPHONE LABORATORIES INCORPORATED
6S
SD-99311-01-E6

SC 6
DISCONNECT





ISSUE 15D

REMOTE TESTING CIRCUIT- FAR END (2) SD 99311-01-E7

BELL TELEPHONE LABORATORIES INCORPORATED 65

SD-99311-01-E7

SD-99311-01-FI

SD-99311-01 7 PAGES

CIRCUIT REQUIREMENTS

REMOTE TESTING CIRCUIT - FAR END

DRAWING ISSUE 1 2A 3A 4D 6B 9D

APPARATUS DESIG	CODE	OPT.	FIG.	MECH REQT BSP FIG	CONT PRES	ARM TRVL	CIRCUIT PREPARATION BLOCK OR INSULATE	TEST CLIP DATA CONN BAT.	CONN GRD	TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQT TEST WDG	TEST FOR	AFTER SOAK MA	TEST MA	READJ MA	REMARKS
MAGNET																	
OD	204C SEL		7						11(ERTS)	GRD	3	ROT	0		210	200	SEE BSP
									1(ERTS)	GRD		ROT	NO		150	160	
									58(HR)	GRD	3	RLS	0		160	150	
RELAY																	
3WO	1/2AK22		3	216					IL(3WO)	GRD			0		27.5	26	MOUNTED WITH (3WOR)
3WOR	1/2AK22		3	216					IU(3WOR)	GRD			0		27.5	26	MOUNTED WITH(3WO)
6OV	1/2AK22		3	216					IL(6OV)	GRD			0		27.5	26	MOUNTED WITH (6OVR)
6OVR	1/2AK22		3	216					IU(6OVR)	GRD			0		27.5	26	MOUNTED WITH (6OV)
A1-S	AJ202		2	500					IU REL TST	GRD			0		42.5	40.5	
ANS	1/2AK22	ZP	3	216			B(ANS)		IU(ANS)	GRD			0		28.6	26	MOUNTED WITH (+T)
B1	292E		2				(5)D	11(B1)	13(B1)	B/G	1,2		0		10		
B2								21(32)	23(B2)	B/G	1,2		0		10		
B3								31(B3)	33(B3)	B/G	1,2		0		10		
B4								41(B4)	43(B4)	B/G	1,2		0		10		
B5								51(B5)	53(B5)	B/G	1,2		0		10		
C1	1/2AK2		2	1					1U(C1)	GRD			0		12.1	11.5	MOUNTED WITH (C2)
C2	1/2AK2		2	1					1L(C2)	GRD			0		12.1	11.5	MOUNTED WITH (C1)
C3	1/2AK2		2	1					1U(C3)	GRD			0		12.1	11.5	MOUNTED WITH (C4)
C4	1/2AK2		2	1					1L(C4)	GRD			0		12.1	11.5	MOUNTED WITH (C3)
CC	1/2AK22		3	216					1L(CC)	GRD			0		27.5	26	MOUNTED WITH (CCR)
CCR	1/2AK22		3	216					1U(CCR)	GRD			0		27.5	26	MOUNTED WITH (CC)
CN	AG34		3	3078					U(CN)	GRD			0		18	17	
													W		3	2.8	
													P		1.5	1.8	
CR	1/2AK22		3	216					1L(CR)	GRD			0		27.5	26	MOUNTED WITH (CRR)
CRR	1/2AK22		3	216					1U(CRR)	GRD			0		27.5	26	MOUPTED WITH (CR)
CT	1/2AK22	ZP	1	216			5(CT)		IL(CT)	GRD			0		28.6	26	MOUNTED WITH (CTR)
CTR	1/2AK22	ZP	1	216					IU(CTR)	GRD			0		28.6	26	MOUNTED WITH (CT)

TEST NOTES:

1. REMOVE ASSOCIATED LIMITER & DETECTOR CIRCUIT BOARD

2.

REL UNDER TEST	TEST CLIP DATA CONN SLEEVE
B1	15(B1)
B2	25(B2)
B3	35(B3)
B4	45(B4)
B5	55(B5)

A. CONNECT (L2) TERM. OF TEST SET TO BAT. TERM. OF TEST SET.
B. PLACE (L) KEY IN NEUTRAL POSITION.
C. CONNECT SLEEVE OF (T&R) TEST JACK TO EACH LOAD CONTACT OF RELAY UNDER TEST AS INDICATED IN ABOVE TABLE.

3 THESE REQUIREMENTS SHALL BE MET IN ALL POSITIONS OF THE SWITCH.

REMOTE TESTING CIRCUIT - FAR END — SD-99311-01-FI

BELL TELEPHONE LABORATORIES INCORPORATED

PAGE 1

CIRCUIT REQUIREMENTS

DRAWING ISSUE 1 2A 3A 4D 6B 9D

APPARATUS DESIG	CODE	OPT.	FIG.	MECH REQT BSP FIG.	CONT PRES	ARM TRVL	CIRCUIT PREPARATION BLOCK B INSULATE	TEST CLIP DATA CONN BAT	CONN GRD	TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQT TEST WDG	TEST FOR	AFTER SOAK MA	TEST MA	READJ MA	REMARKS
O	AJ15		3	249					U(O)	GRD			O		42.5	40.5	
OIS	1/2AK30		3	202			6B(CT)		1U(OIS)	GRD			O		23	22	MOUNTED WITH (RCCIR)
OL	AG20		3	262					U(OL)	GRD			O	FS	10.7	10.2	
													M	FS	2.0	1.9	
													R	FS	0.9	1.1	
OL1	1/2AK6		3	2					L(OL1)	GRD			O		29	27.5	MOUNTED WITH (LP)
OP	1/2AK8		3	204					1L(OP)	GRD			O		17	16	MOUNTED WITH (OP1)
OP1	1/2AK3		3	204					1U(OP1)	GRD			O		9.2	8.7	MOUNTED WITH (OP)
													R		1.7	1.8	
OS	280AA	ZV	3	5									O	-40		0.9	
													NO	-40		0.4	WINDING ALONE
													O	-40	3.2	3	
													R	-40	0.1	0.2	
								(OS)JK-T	(OS)JK-R	B/G	1		O	-135		2.9	
								(^)JK-T	(OS)JK-R	B/G			NO	-135		1.8	CKT COMB (OS) REL
								(D2)JK-T	(OS)JK-R	B/G			O	-135	11.2	10.5	AND (725) RES
								(OS)JK-T	(OS)JK-R	B/G			R	-135	0.4	0.5	
OS	316F	ZW	3	1				9-(OS)	1+(OS)	B/G	1		O	24	8.1		SOAK ONLY ON PR TST
								9-(OS)	1+(OS)	B/G			P		4.3		
OSI	AG13		3	402					U(OSI)	GRD			O	FS	8.2	7.8	
													M	FS	1.1	1.0	
													R	FS	0.5	0.7	
E	AF144		3	258					U(E)	GRD			O		27.5	26	
EI	AJ43		8	249			(ON)NO,9B(DIS)		U(EI)	GRD			O		24.4	23	
EO	1/2AK4		7	202					1U(EO)	GRD			O		8.9	11.3	MOUNTED WITH(EOR)
EOR	1/2AK4		7	202			4B(ERTR)		1L(EOR)	GRD			O		11.9	11.3	MOUNTED WITH (EO)
ELL	1/2AK47		7	202			8B(XN)		1L(ELL)	GRD	2		O		14.2	12.5	MOUNTED WITH(ETK)
ERT	AJ15		7	249					U(ERT)	GRD			O		42.5	40.5	
ERTR	AJ15		7	249					U(ERTR)	GRD			O		42.5	40.5	
ERTS	1/2AK47		7	202			3B(ERTR)		1U(ERTS)	GRD	2		O		13.2	12.5	MOUNTED WITH (HR)
ERV	AJ83		7	249					U(ERV)	GRD			O		13.2	12.6	
ETK	1/2AK47		7	202					1U(ETK)	GRD	2		O		13.2	12.5	MOUNTED WITH(ELL)
F	1/2AK22		3	216					IL(F)	GRD			O		27.5	26	MOUNTED WITH (FR)
FR	1/2AK22		3	216					IU(FR)	GRD			O		27.5	26	MOUNTED WITH (F)
G	1/2AK22		3	216					IL(G)	GRD			O		27.5	26	MOUNTED WITH (GR)
GR	1/2AK22		3	216					IU(GR)	GRD			O		27.5	26	MOUNTED WITH (G)
GT	1/2AK13		1	203					IL(GT)	GRD			O		24.5	23	MOUNTED WITH (GTI)
GTI	1/2AK13		1	203					IU(GTI)	GRD			O		24.5	23	MOUNTED WITH (GT)

TEST NOTES:

1. WITH CORD IN (OS) JACK.
2. ARMATURE BACK TENSION MIN 20 GRAM READJUST; 15 GRAM TEST.

REMOTE TESTING CIRCUIT - FAR END (2) — SD-99311-01-FI

BELL TELEPHONE LABORATORIES INCORPORATED 6S

PAGE 2

ISSUE 15D

CIRCUIT REQUIREMENTS

DESIG	CODE	OPT.	FIG.		BSP FIG.	CONT PRES	ARM. TRVL	BLOCK OR INSULATE	TEST CLIP DATA CONN BAT.	TEST CLIP DATA CONN GRD	TEST SET PREP	SEE TEST NOTE	TEST WDG	TEST FOR	AFTER SOAK MA	TEST MA	READJ MA	REMARKS
RELAYS																		
HR	1, 2AK47		7		202			103(NP), 18(3WO)	2L(HR)	1L(HR)	B/G	3		0		13.2	12.5	MOUNTED WITH (ERTS)
IN	1/2AK22		3		216					1L(IN)	GRD			0		27.5	26	MOUNTED WITH (INR)
INR	1/2AK22		3		216					1U(INR)	GRD			0		27.5	26	MOUNTED WITH (IN)
K1A	293E		2					(S)0	11(K1A)	13(K1A)	B/G	1,2		0		10		
K2A									21(K2A)	23(K2A)	B/G	1,2		0		10		
K3A									31(K3A)	33(K3A)	B/G	1,2		0		10		
K4A									41(K4A)	43(K4A)	B/G	1,2		0		10		
K5A									51(K4A)	53(K5A)	B/G	1,2		0		10		
K1C	293E		2					(S)0	11(K1C)	13(K1C)	B/G	1,2		0		10		
K2C									21(K2C)	23(K2C)	B/G	1,2		0		10		
K3C									31(K3C)	33(K3C)	B/G	1,2		0		10		
K4C									41(K5C)	43(K5C)	B/G	1,2		0		10		
K5C									51(K5C)	53(K5C)	B/G	1,2		0		10		
KP	AF20		3		205					L(KP)	GRO			0		36	34	
KP1	280J	ZV	3		B				(KP1)JK-T	(KP1)JK-R	B/G			0	-12		0.3	
														NO	-12		0.2	
														0	-12	3.2	3	
														NO	12	1.7	1.0	
														R	12	0.9	1	
KPI	316E	ZW	3		3				9-(KPI)	1+(KPI)	B/G			0	9	3		SOAK ONLY ON OPR TST
									9-(KPI)	1+(KPI)	B/G			R		0.8		
KPR	1/2AK5		3		4					1U(KPR)	GRO			0		15.8	15	MOUNTED WITH (MR)
LL	1/2AK44	N,ZS	3		222					1U(LL)	GRD			0		27.5	26	MOUNTED WITH (REXS)
LL1	1/2AK22	ZJ	3		216					1L(LL1)	GRD			0		27.5	26	MOUNTED WITH (REXI)
LP	1/2A.6		3		2					1U(LP)	GRD			0		29	27.5	MOUNTED WITH (DL1)
LRP	1/2AK22		3		216					1L(LRP)	GRD			0		27.5	26	MOUNTED WITH (LRPR)
LRPR	1/2AK22		3		216					1U(LRPR)	GRO			0		27.5	26	MOUNTED WITH (LRP)
LS	AJ516	YS	3		299			9(LS)		U(LS)	GRD			0		40.1	39	
LSR	1/2 AK22	YS	3		216					1U(LSR)	GRD			0		27.5	26	MTD WITH SPARE

DRAWING ISSUE: 1, 2A, 3A, 4D, 7A, 9B, 12B

TEST NOTES:

1. REMOVE ASSOCIATED LIMITER & DETECTOR CIRCUIT BOARD.
2.

REL UNDER TEST	TEST CLIP DATA CONN SLEEVE
K1A	15(K1A)
K2A	25(K2A)
K3A	35(K3A)
K4A	45(K4A)
K5A	55(K5A)

REL UNDER TEST	TEST CLIP DATA CONN SLEEVE
K1C	15(K1C)
K2C	25(K2C)
K3C	35(K3C)
K4C	45(K4C)
K5C	55(K5C)

A. CONNECT L2 TERM. OF TEST SET TO BAT. TERM. OF TEST SET.

B. PLACE (L) KEY IN NEUTRAL POSITION.

C. CONN SLEEVE OF (T & R) TEST JACK TO EACH LOAD CONTACT OF REL UNDER TEST AS INDICATED IN CONN SLEEVE COLUMN.

3. ARMATURE BACK TENSION MIN 20 GRAM READJUST: 15 GRAM TEST.

REMOTE TESTING CIRCUIT - FAR END

SD-99311-01-F2

BELL TELEPHONE LABORATORIES INCORPORATED

CIRCUIT REQUIREMENTS

DESIG	CODE	OPT.	FIG		BSP FIG.	CONT PRES	ARM TRVL	BLOCK OR INSULATE	TEST CLIP DATA CONN BAT.	TEST CLIP DATA CONN GRD	TEST SET PREP	SEE TEST NOTE	TEST WDG	TEST FOR	AFTER SOAK MA	TEST MA	READJ MA	REMARKS
M	AJ516		3		299					U(M)	GRO			0		40.1	39	
MA	1/2AK22		3		216					1L(MA)	GRO			0		27.5	26	MOUNTED WITH (MAR)
MAR	1/2AK22		3		216					1U(MAR)	GRO			0		27.5	26	MOUNTED WITH (MA)
MOF	1/2AK22		3		216					1L(MOF)	GRO			0		27.5	26	MOUNTED WITH (MOFR)
MOFR	1/2AK22		3		216					1U(MOFR)	GRO			0		27.5	26	MOUNTED WITH (MOF)
MR	1/2AK5		3		4					1L(MR)	GRO			0		15.8	15	MOUNTED WITH (KPR)
NC	AJ83		8		249			2B(TF2)		U(NC)	GRO			0		13.2	12.6	
NC1	1/2AK22		8		216					1U(NC1)	GRD			0		27.5	26	MOUNTED WITH (NC2)
NC2	1/2AK22		8		216					1L(NC2)	GRD			0		27.5	26	MOUNTED WITH (NC1)
NP	AG19		3		405B				L(NP)		BAT.	1		0		21	20	
														H		2.0	1.8	
														R		1.0	1.3	
NT	1/2AK22		3		216					1L(NT)	GRO			0		27.5	26	MOUNTED WITH (NTR)
NT1	1/2AK4		7		202					1L(NT1)	GRD			0		11.9	11.3	MOUNTED WITH (TS1)
NT2	1/2AK22	YV	1		216					1U(NT2)	GRO			0		27.5	26	MOUNTED WITH (TS2)
NTR	1/2 AK22		3		216					1U(NTR)	GRD			0		27.5	26	MOUNTED WITH (NT)
ON	AJ83		3		249					U(ON)	GRO			0		13.2	12.6	
ON1	AJ202		3		500					U(ON1)	GRO			0		42	40.5	
ON2	AJ202		3		500					U(ON2)	GRO			0		42	40.5	
P	AJ102		3		75			(RCC1) 0	1U(P)	2L(P)	M	2,3	P/S	0		14.7	14	
														R		5.8	6.1	
PR	1/2AK22		3		216					1L(PR)	GRD			0		27.5	26	MOUNTED WITH (PRR)
PRR	1/2AK22		3		216					1U(PRR)	GRD			0		27.5	26	MOUNTED WITH (PR)

DRAWING ISSUE: 1, 2A, 3A, 4D, 7A, 9B, 12B

TEST NOTES:

1. ARMATURE BACK TENSION MINIMUM 45 GRAMS READJUST, 40 GRAMS TEST.
2. CONTACT MAKE 5, NO MAKE 8.5, READJUST, MAKE 3.5, NO MAKE 10, TEST.
3. P/S PRIMARY AND SECONDARY IN SERIES AIDING.

ISSUE 16D

(2)

REMOTE TESTING CIRCUIT - FAR END

SD-99311-01-F2

BELL TELEPHONE LABORATORIES INCORPORATED

6S

CIRCUIT REQUIREMENTS

APPARATUS DESIG	APPARATUS CODE	APPARATUS OPT.	APPARATUS FIG.	MECH REQT BSP FIG.	MECH REQT CONT PRES	MECH REQT ARM. TRVL.	CIRCUIT PREPARATION BLOCK OR INSULATE	CIRCUIT PREPARATION TEST CLIP DATA CONN BAT.	CIRCUIT PREPARATION TEST CLIP DATA CONN GRD	TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQT TEST WDG	DIRECT CURRENT FLOW REQT TEST FOR	DIRECT CURRENT FLOW REQT AFTER SOAK MA	DIRECT CURRENT FLOW REQT TEST MA	DIRECT CURRENT FLOW REQT READJ MA	REMARKS
+R	1/2AK22		3	216					1L(+R)	GRD			0		27.5	26	MOUNTED WITH (+RR)
-R	1/2AK22		3	216					1L(-R)	GRD			0		27.5	26	MOUNTED WITH (-RR)
+RR	1/2AK22	B	3	216					1U(+RR)	GRD			0		27.5	26	MOUNTED WITH (+R) OR (ARM)
-RR	1/2AK22		3	216					1U(-RR)	GRD			0		27.5	26	MOUNTED WITH (-R)
RC	1/2AK22		3	216					1U(RC)	GRD			0		27.5	26	MOUNTED WITH (TRC)
RCC1	AJ516		3	299					U(RCC1)	GRD			0		41	39	
RCC1R	1/2AK30		3	202					1L(RCC1R)	GRD			0		23.5	22	MOUNTED WITH (C15)
RCOR	1/2AK22		3	216					1U(RCOR)	GRD			0		27.5	26	MOUNTED WITH (+R)
REX	1/2AK22	M,2B	3	216					1L(REX)	GRD			0		27.5	26	MOUNTED WITH (REX)
REX1	1/2AK22	M,2B	3	216					1U(REX1)	GRD			0		27.5	26	MOUNTED WITH (LL1)
REX2	1/2AK22	M,2B	3	216					1U(REX2)	GRD			0		27.5	26	MOUNTED WITH (REX)
REX3	1/2AK44	M,2D	3	222					1L(REX3)	GRD			0		27.5	26	MOUNTED WITH (LL)
RG	1/2AK22		3	216					1L(RG)	GRD			0		27.5	26	MOUNTED WITH (RGR)
RGR	1/2AK4		3	216					1U(RGR)	GRD			0		27.5	26	MOUNTED WITH (RG)
RL	B1040		3	6		50			2W(RL)	GRD			0		3.1	2.9	
													R		1.6	1.7	
ROM	1/2AK22		3	216					1L(ROM)	GRD			0		27.5	26	MOUNTED WITH (ROM3)
ROMD	1/2AK23		1	216					1U(ROMD)	GRD			0		27.5	26	MOUNTED WITH (SD)
ROM1	1/2AK4		3	202					1L(ROM1)	GRD			0		11.9	11.3	MOUNTED WITH (ROM2)
ROM2	1/2AK4		3	202					1U(ROM2)	GRD			0		11.9	11.3	MOUNTED WITH (ROM1)
ROMD	1/2AK22		1	216					1U(ROMD)	GRD			0		27.5	26	MOUNTED WITH (SD)
ROR	1/2AK22		3	216					1U(ROR)	GRD			0		39.5	26	MOUNTED WITH (+TM)
RT	1/2AK22	ZJ,XJ	3	216					1U(RT)	GND			0		27.5	26	MTD WITH (+T)SEE FIG 3
RV	1/2AK22		3	216					1L(RV)	GRD			0		27.5	26	MOUNTED WITH (RVF)
RVM	1/2AK22		3	216					1L(RVM)	GRD			0		27.5	26	MOUNTED WITH (RVM)
RVMR	1/2AK22		3	216					1U(RVMR)	GRD			0		27.5	26	MOUNTED WITH (RVM)
RVR	1/2AK22		3	216					1U(RVR)	GRD			0		27.5	26	MOUNTED WITH (RV)
S	AJ138	YA	3	56				1U(S)	2L(S)	M	1	P/S	0		12.6	12	
													R		5.2	5.5	
S	AJ26	ZZ	3	558				2L(E)	1U(S)	M		P/S	0		16.3	15.5	
													R		6.3	6.8	
SD	1/2AK22		1	216					1L(SD)				0		27.5	26	MOUNTED WITH ROMD
SL	B1056		3	3		30	(3WD)0	1M(SL)	2M(SL)	B/G			0	25	2.5	3.3	
													R	25	1.9	2.0	
SD	1/2AK22		1	216					1L(SD)	B/G			0		27.5	26	MOUNTED WITH (ROMD)
SRT	1/2AK22		3	216					1L(SRT)	GRD			0		27.5	26	MOUNTED WITH (SRTR)
SRTR	1/2AK22		3	216					1U(SRTR)	GRD			0		27.5	26	MOUNTED WITH (SRT)

DRAWING ISSUE 1 2A 3A 3D 9B 10B 12B

PAGE 5

TEST NOTES:
1. P/S PRIMARY AND SECONDARY IN SERIES AIDING.

SD-99311-01-F3

BELL TELEPHONE LABORATORIES INCORPORATED

CIRCUIT REQUIREMENTS

APPARATUS DESIG	APPARATUS CODE	APPARATUS OPT.	APPARATUS FIG.	MECH REQT BSP FIG.	MECH REQT CONT PRES	MECH REQT ARM. TRVL.	CIRCUIT PREPARATION BLOCK OR INSULATE	CIRCUIT PREPARATION TEST CLIP DATA CONN BAT.	CIRCUIT PREPARATION TEST CLIP DATA CONN GRD	TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQT TEST WDG	DIRECT CURRENT FLOW REQT TEST FOR	DIRECT CURRENT FLOW REQT AFTER SOAK MA	DIRECT CURRENT FLOW REQT TEST MA	DIRECT CURRENT FLOW REQT READJ MA	REMARKS
ST	1/2AK22		3	216					1L(ST)	GRD			0		27.5	26	MOUNTED WITH (STR)
STA	AF9		3	213					U(STA)	GRD			0		8.6	8.2	
+STA	1/2AK22		3	216					1L(+STA)	GRD			0		27.5	26	MOUNTED WITH (+STAR)
-STA	1/2AK22		3	216					1L(-STA)	GRD			0		27.5	26	MOUNTED WITH (-STAR)
STR	1/2AK22		3	216					1U(STR)	GRD			0		27.5	26	MOUNTED WITH (ST)
+STAR	1/2AK22		3	216					1U(+STAR)	GRD			0		27.5	26	MOUNTED WITH (+STA)
-STAR	1/2AK22		3	216					1U(STAR)	GRD			0		27.5	26	MOUNTED WITH (-STA)
+T	1/2AK22		3	216					1L(+T)	GRD			0		27.5	26	MTD WITH(+T)FOR(ANS)
-T	1/2AK22		3	216					1L(-T)	GRD			0		27.5	26	MTD WITH(-TR OR RT)
TB	AC24	M,2B	3	199			(LL)0, TT(LL)		U(TB)	GRD			0		13.7	13	
													R		0.7	1	
+TR	1/2AK22	B	3	216					1U(+TR)	GRD			0		27.5	26	MOUNTED WITH (+T)
-TR	1/2AK22	B	3	216					1U(-TR)	GRD			0		27.5	26	MTD WITH (-T), SEE FIG 3
TD	1/2AK22		3	216					1L(TD)	GRD			0		27.5	26	MOUNTED WITH (TDR)
TDR	1/2AK22		3	216					1U(TDR)	GRD			0		27.5	26	MOUNTED WITH (TD)
TF	1/2AK35		8	202			1B(NC)		1U(TF)	GRD	1				12.4	11.8	MOUNTED WITH(TFR)
TFI	1/2AK41		8	202			2(TFR)	2U(TF1)	1U(TF1)	B/G	1		0	48	31.5	30	MOUNTED WITH(TF2)
													M	48	44	42	
TF2	1/2AK41		8	202					1L(TF2)	GRD			0	48	31.5	30	MOUNTED WITH (TF1)
													M	48	44	42	
TFR	1/2AK35		8	202			1B(NC)		1L(TFR)	GRD	1		0	48	31.5	30	MOUNTED WITH (TF)
													M	48	44	42	
TK	1/2AK22		3	216					1L(TK)	GRD			R		27.5	26	MOUNTED WITH (TKR)
TKM	AJ15		3	249					U(TKM)	WTG			0		42.5	40.5	
TKR	1/2AK22		3	216					1U(TKR)	GRD			0		27.5	26	MOUNTED WITH(TK)
TP	AJ119	XT,XJ	3	53					L(TP)	BAT.			0	-50	19.5	18.5	
													NO	-50	13.5	18.5	

DRAWING ISSUE 1 2A 3A 3D 9B 10B 12B

PAGE 6

TEST NOTES:
1. REMOVE TIMER (TF) CP D3 BEFORE MAKING TEST

ISSUE 19AC

REMOTE TESTING CIRCUIT - FAR END (2)

SD-99311-01-F3

BELL TELEPHONE LABORATORIES INCORPORATED

6S

CIRCUIT REQUIREMENTS

APPARATUS DESIG	APPARATUS CODE	APPARATUS OPT	APPARATUS FIG.	MECH REQT BEP FIG.	MECH REQT CONT PRES	MECH REQT ARM TRVL.	CIRCUIT PREPARATION BLOCK OR INSULATE	CIRCUIT PREPARATION TEST CLIP DATA CONN BAT.	CIRCUIT PREPARATION TEST CLIP DATA CONN GRD	TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQT TEST W/OG	DIRECT CURRENT FLOW REQT TEST FOR	DIRECT CURRENT FLOW REQT AFTER SOAK TEST MA	DIRECT CURRENT FLOW REQT AFTER SOAK READJ MA	REMARKS
TRG	U2AK2L		3	216					IL(TRG)	GRD			0	27.5	26	MOUNTED WITH (RC)
TS	U2AK22		3	216					IL(TS)	GRD			0	27.5	26	MOUNTED WITH (TSR)
TSI	U2AK4		7	202					IU(TSI)	GRD			0	11.9	11.3	MOUNTED WITH (NTI)
TS2	U2AK22	YY	1	216					IL(TS2)	GRD			0	27.5	26	MOUNTED WITH (NT2)
TSR	U2AK22		3	216					IU(TSR)	GRD			0	27.5	26	MOUNTED WITH (TS)
TT	U2AK22		3	216					IL(TT)	GRD			0	27.5	26	MOUNTED WITH (TTR)
TTR	U2AK22		3	216					IU(TTR)	GRD			0	27.5	26	MOUNTED WITH (TT)
VR	U2AK22		3	216					IL(VR)	GRD			0	27.5	26	MOUNTED WITH (VRR)
VRR	U2AK22		3	216					IU(VRR)	GRD			0	27.5	26	MOUNTED WITH (VR)
XN	AF32		3	208					U(XN)	GRD			0	32	30.5	
TIMING REQT CIRCUIT PACK																
ABC	D3		1				(DL)O				1,3					
TF	D3		8								1,5					
TMR	CFI		3								1					

TEST NOTES:

1. USE TEST SET FOR TIMING TESTS:

DESIG	CKT PREP BLOCK OR INSULATE	TEST CLIP DATA CONN BK	TEST CLIP DATA CONN R	TEST CLIP DATA CONN W	TEST SET PREP SEND KEY	TEST SET PREP RCV SW START	TEST SET PREP RCV SW STOP	TIME REQT MSEC MIN	TIME REQT MSEC MAX	SEE TEST NOTE
ABC	(DL)O	GRD	IL(GT)	NOTE 3	MK	OC	GRD	NOTE 3	NOTE 3	3
TF		GRD	IL(TFR)	NOTE 5	MK	OC	GRD	NOTE5	NOTE5	5
TMR	(DS)IO			12F(LP)	MK	OC	GRD	500	610	2
	(DL)INO	GRD	IU(LP)	10F(D)	MK	OC	GRD	1230	1370	4
	(ON2)O	GRD	IL(ROH)	12F(ROHL	MK	GRD	OC	1230	1370	4

2. PUT OPEN PLUG IN (TJI) JACK. USING A CLIP CORD CONNECT FRAME GROUND TO 12B(LP) RELAY CONNECT A 10IC HANDSET E/W W20B CORD OR W20J CORD AND 624 TOOLS BETWEEN GROUND AND 5(R) TERM STRIP. HOLD (TST) KEY TO OPR POSITION AND IMMEDIATELY DIAL 0 (ZERO) WITH HAND SET. ADJUST (DTH) POTENTIOMETER UNTIL CORRECT TIMING IS OBTAINED. CALIBRATE TEST SET FOR 500 MS HALF SCALE MAKING FULL SCALE 1000 MS.

3. BLOCK OPERATE (LL). CONNECT CONN W TO 5F(GT). TAKE READING 1. CONNECT CONN W TO 11F(GT1). TAKE READING 2. READING 2 MINUS READING 1 SHOULD BE BETWEEN 40 AND 60 MS.

4. CALIBRATE TEST SET FOR 500 MS QUARTER SCALE MAKING FULL SCALE 2000 MS.

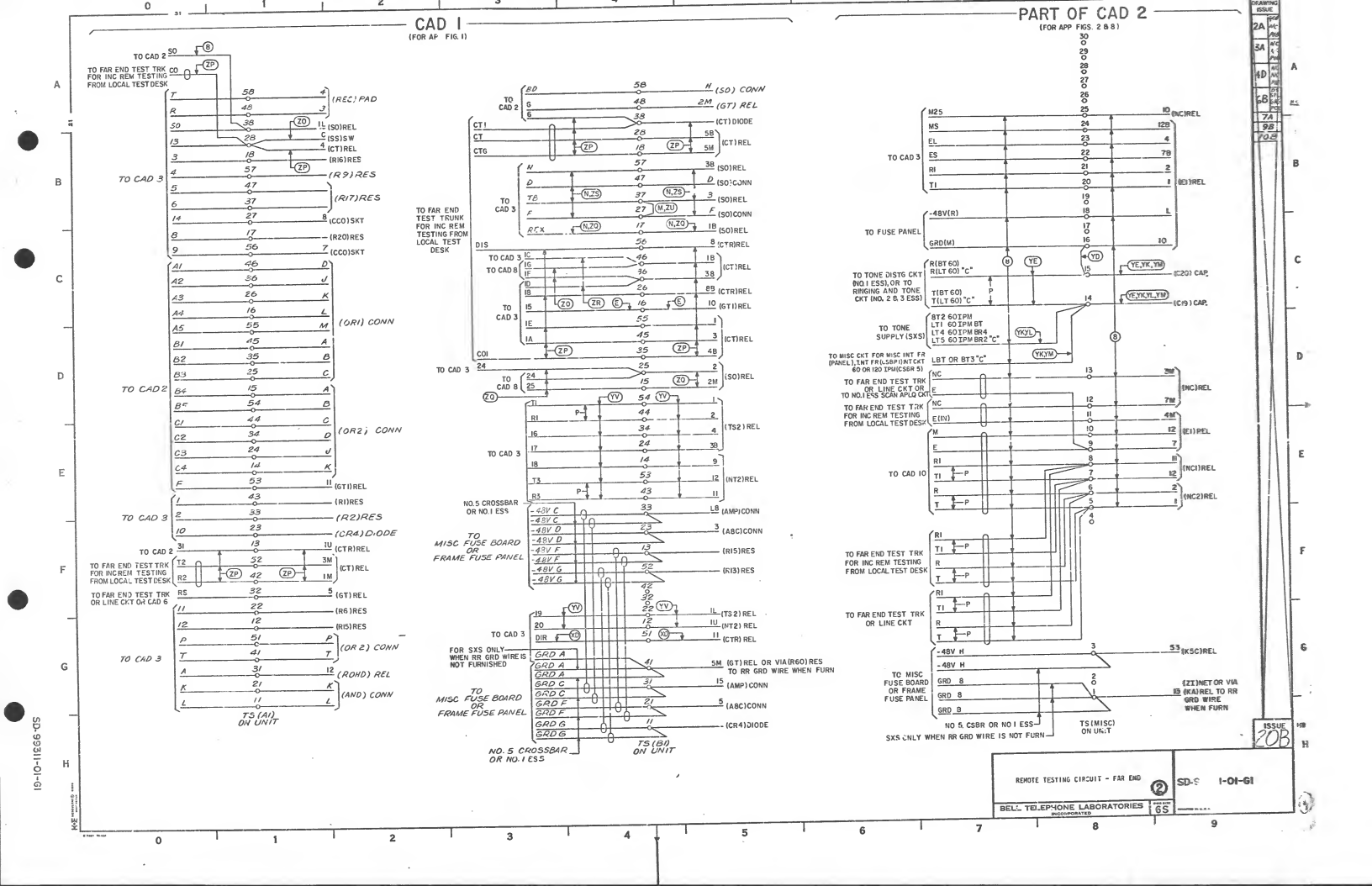
5. CONNECT CONN W TO 4M(TFR). TAKE READING 1. CONNECT CONN W TO 6M(TFI). TAKE READING 2. READING 2 MINUS READING 1 SHOULD BE BETWEEN 2500 AND 2700 MS.

ISSUE 1 KB

REMOTE TESTING CIRCUIT - FAR END (2) SD-99311-01-F4

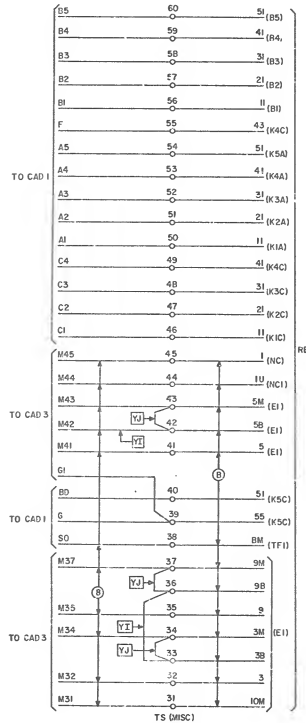
BELL TELEPHONE LABORATORIES INCORPORATED

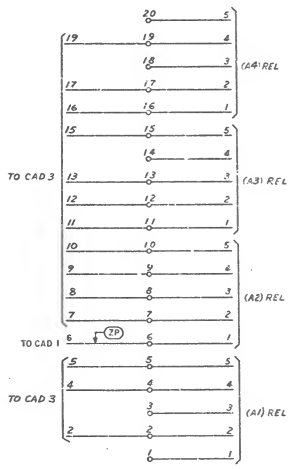
SD-99311-01-F4

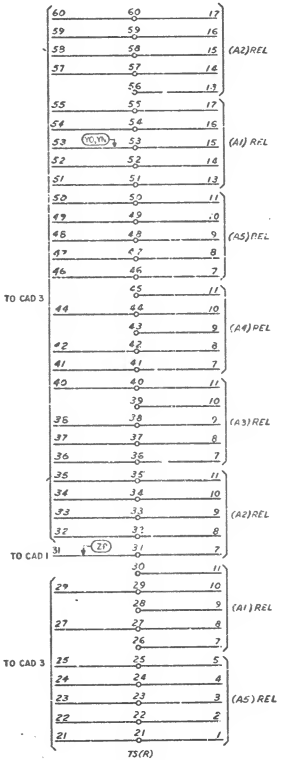

CAD 1
(FOR AP FIG. 1)
PART OF CAD 2
(FOR APP FIGS. 2 & 3)
TO CAD 2
TO FAR END TEST TRK FOR INC REM TESTING FROM LOCAL TEST DESK
TO CAD 3
TO CAD 2
TO FAR END TEST TRK FOR INCREM TESTING FROM LOCAL TEST DESK
TO FAR END TEST TRK OR LINE CKT OR CAD 6
TO CAD 3
TO CAD 2
TO CAD 3
TO CAD 3
TS (A1) ON UNIT
TO FAR END TEST TRUNK FOR INC REM TESTING FROM LOCAL TEST DESK
TO CAD 3
TO CAD 8
TO CAD 3
TO CAD 8
TO CAD 3
TO CAD 3
NO. 5 CROSSBAR OR NO. I ESS
TO MISC FUSE BOARD OR FRAME FUSE PANEL
TO CAD 3
FOR SXS ONLY WHEN RR GRD WIRE IS NOT FURNISHED
TO MISC FUSE BOARD OR FRAME FUSE PANEL
NO. 5 CROSSBAR OR NO. I ESS
TS (B1) ON UNIT
TO CAD 3
TO FUSE PANEL
TO TONE DISTG CKT (NO. I ESS), OR TO RINGING AND TONE CKT (NO. 2 & 3 ESS)
TO TONE SUPPLY (SXS)
TO MISC CKT FOR MISC INT FR (PANEL), INT FR (SBP) INT CKT 60 OR 120 IPM (CSBR 5)
TO FAR END TEST TRK OR LINE CKT OR TO NO. I ESS SCAN APLQ CKT
TO FAR END TEST TRK FOR INC REM TESTING FROM LOCAL TEST DESK
TO CAD 10
TO FAR END TEST TRK FOR INC REM TESTING FROM LOCAL TEST DESK
TO FAR END TEST TRK OR LINE CKT
TO MISC FUSE BOARD OR FRAME FUSE PANEL
NO. 5 CSBR OR NO. I ESS
SXS ONLY WHEN RR GRD WIRE IS NOT FURN
TS (MISC) ON UNIT
(SO) CONN
(GT) REL
(CT) DIODE
(CT) REL
(SO) REL
(SO) CONN
(SO) REL
(SO) CONN
(SO) REL
(CTR) REL
(CT) REL
(GT) REL
(TS2) REL
(NT2) REL
(AMP) CONN
(ABC) CONN
(R15) RES
(R13) RES
(TS2) REL
(NT2) REL
(CTR) REL
(GT) REL OR VIA (R60) RES TO RR GRD WIRE WHEN FURN
(AMP) CONN
(ABC) CONN
(CR4) DIODE
(REC) PAD
(SO) REL
(SS) SW
(CT) REL
(R16) RES
(R9) RES
(RI7) RES
(CCO) SKT
(R20) RES
(CCO) SKT
(ORI) CONN
(OR2) CONN
(GT) REL
(RI) RES
(R2) RES
(CR4) DIODE
(CT) REL
(GT) REL
(R6) RES
(R15) RES
(OR 2) CONN
(ROHD) REL
(AND) CONN
(INC) REL
(EI) REL
(NC1) REL
(NC2) REL
(K5C) REL
(ZI) NET OR VIA (KA) REL TO RR GRD WIRE WHEN FURN
(C20) CAP.
(C19) CAP.
REMOTE TESTING CIRCUIT - FAR END
SD-9
1-01-G1
BELL TELEPHONE LABORATORIES INCORPORATED
ISSUE 20B

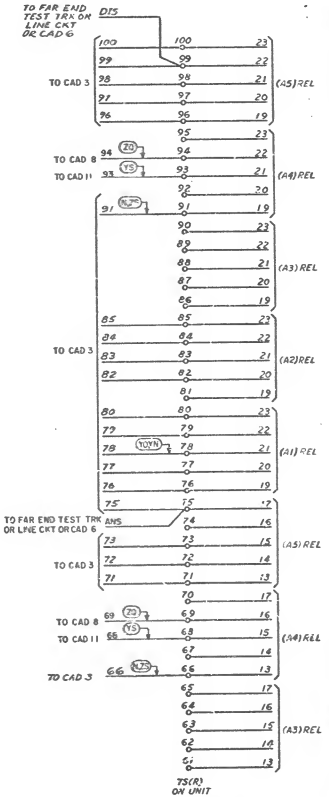
PART OF CAD 2

(FOR APP FIGS 2&8)









GRAPHIC ISSUE 2A 3A 4D 6B 7A 9B 10B

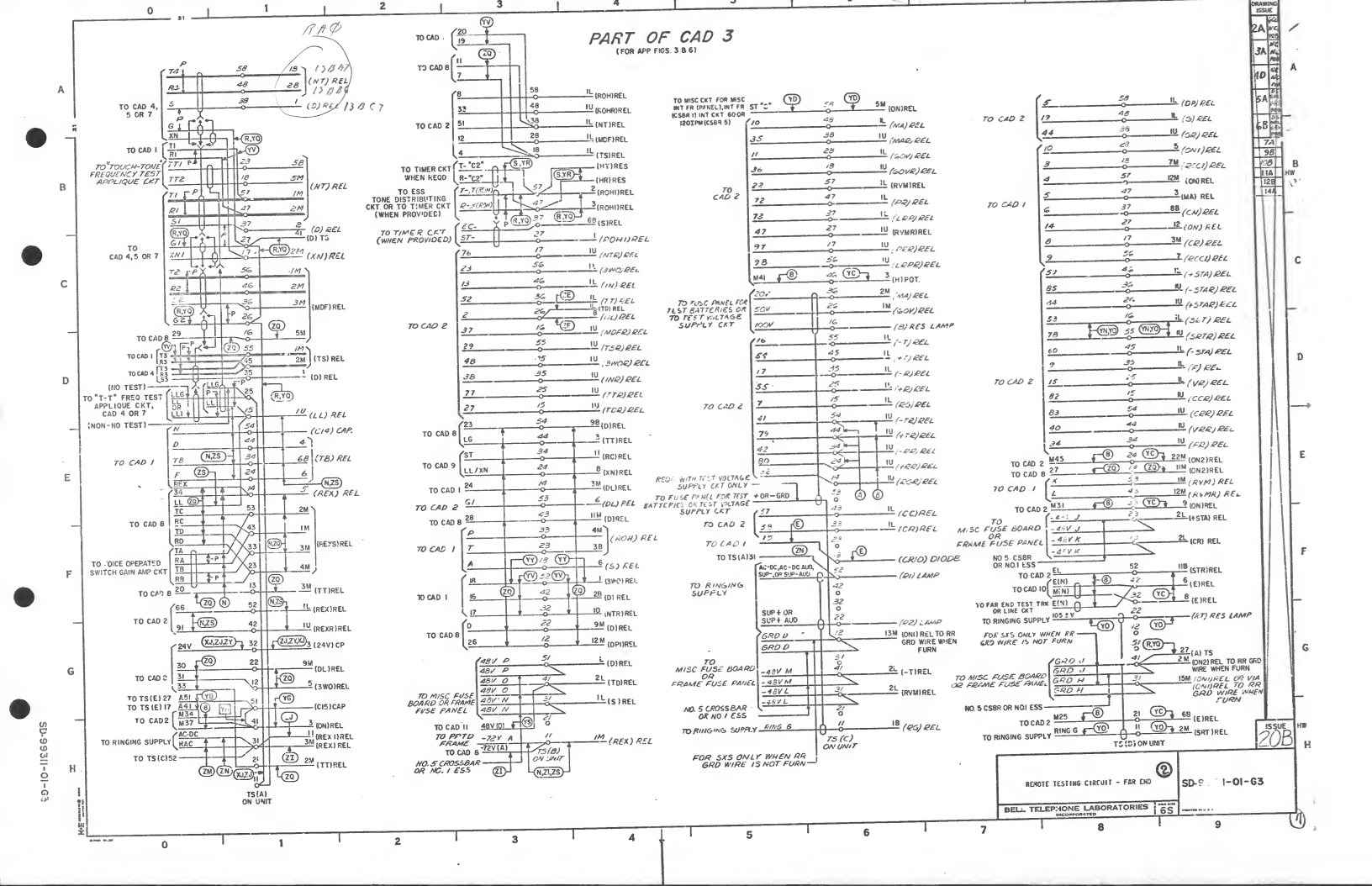
ISSUE 17B

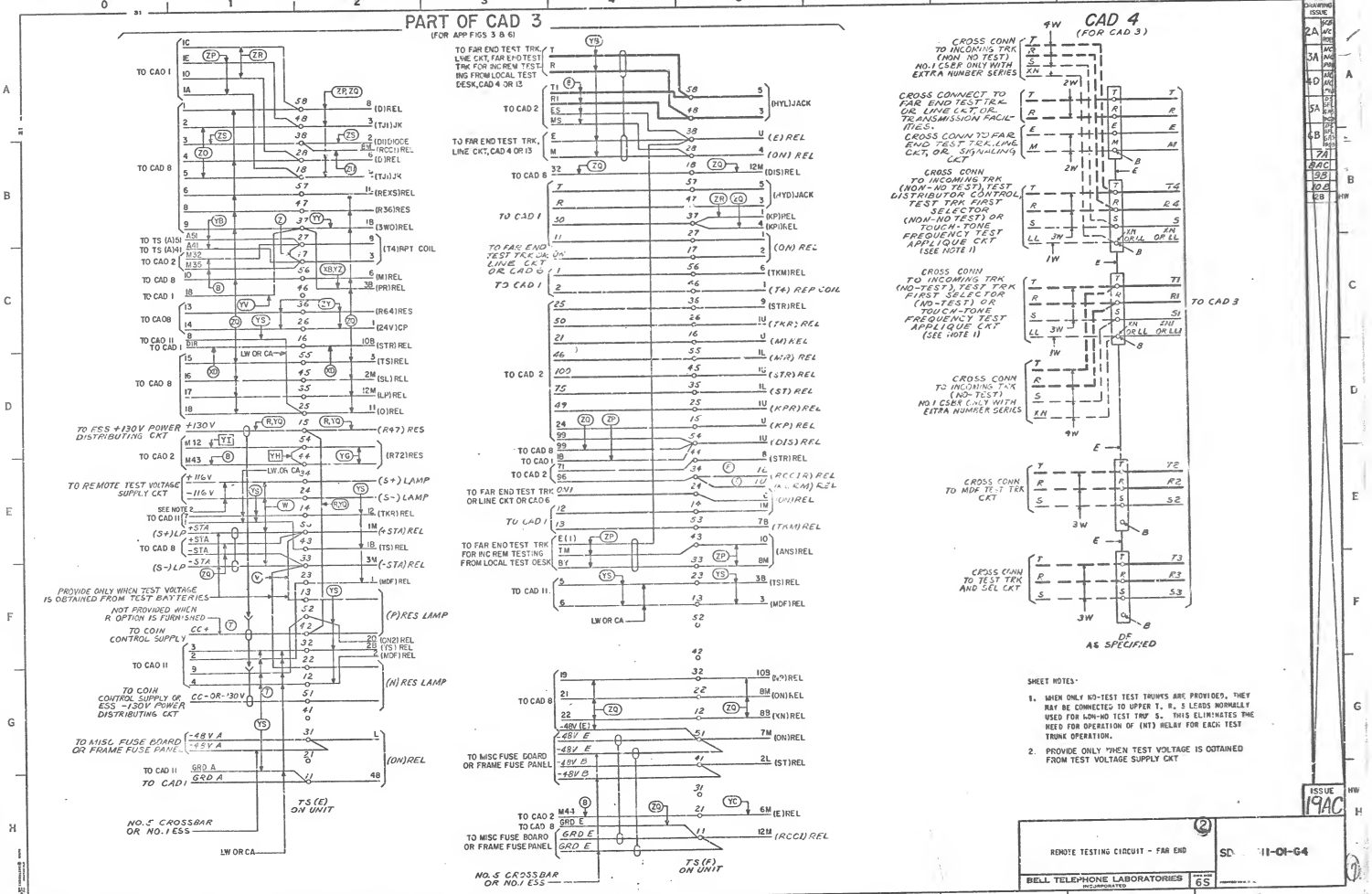
REMOTE TESTING CIRCUIT - FAR END

SD-99311-01-G2

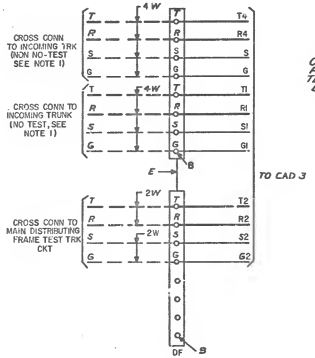
BELL TELEPHONE LABORATORIES INCORPORATED

SD-99311-01-G2

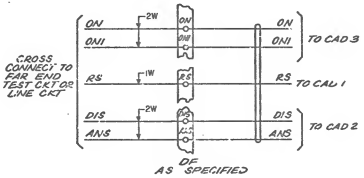

PART OF CAD 3
(FOR APP FIGS. 3 & 6)
TO CAD 4, 5 OR 7
TO CAD 1
TO "TOUCH-TONE FREQUENCY TEST" APPLIQUE CKT
TO CAD 4,5 OR 7
TO CAD 8
TO CAD 4
(NO TEST)
TO "T-T" FREQ TEST APPLIQUE CKT, CAD 4 OR 7
(NON-NO TEST)
TO CAD 1
TO CAD 8
TO VOICE OPERATED SWITCH GAIN AMP CKT
TO CAD 8
TO CAD 2
TO CAD 8
TO TS(E) 27
TO TS(E) 17
TO CAD 2
TO RINGING SUPPLY
TO TS(C)52
TS(A) ON UNIT
TO CAD 1
TO CAD 8
TO TIMER CKT WHEN REQD
TO ESS TONE DISTRIBUTING CKT OR TO TIMER CKT (WHEN PROVIDED)
TO TIMER CKT (WHEN PROVIDED)
TO CAD 2
TO CAD 8
TO CAD 9
TO CAD 1
TO CAD 2
TO CAD 8
TO CAD 1
TO CAD 8
TO CAD 1
TO CAD 8
TO MISC FUSE BOARD OR FRAME FUSE PANEL
TO CAD 11
TO PPTD FRAME
TO CAD 8
NO. 5 CROSSBAR OR NO. 1 ESS
TO MISC CKT FOR MISC INT FR (PANEL), INT FR (CSBR 1) INT CKT 60 OR 120IPM (CSBR 5)
TO CAD 2
TO FUSE PANEL FOR TEST BATTERIES OR TO TEST VOLTAGE SUPPLY CKT
REQ. WITH TEST VOLTAGE SUPPLY CKT ONLY
TO FUSE PANEL FOR TEST BATTERIES OR TEST VOLTAGE SUPPLY CKT
TO CAD 2
TO CAD 1
TO TS(A)31
TO RINGING SUPPLY
TO MISC FUSE BOARD OR FRAME FUSE PANEL
NO. 5 CROSSBAR OR NO.1 ESS
TO RINGING SUPPLY
FOR SXS ONLY WHEN RR GRD WIRE IS NOT FURN
TS(C) ON UNIT
TO CAD 2
TO CAD 1
TO CAD 2
TO CAD 8
TO CAD 1
TO CAD 2
TO MISC FUSE BOARD OR FRAME FUSE PANEL
NO. 5 CSBR OR NO.1 ESS
TO CAD 2
TO CAD 10
TO FAR END TEST TRK OR LINE CKT
TO RINGING SUPPLY
FOR SXS ONLY WHEN RR GRD WIRE IS NOT FURN
TO MISC FUSE BOARD OR FRAME FUSE PANEL
NO. 5 CSBR OR NO.1 ESS
TO CAD 2
TO RINGING SUPPLY
TS(D) ON UNIT
REMOTE TESTING CIRCUIT - FAR END
SD-99311-01-G3
BELL TELEPHONE LABORATORIES INCORPORATED
ISSUE 20B


PART OF CAD 3
(FOR APP FIGS 3 & 6)
CAD 4
(FOR CAD 3)
TO CAO I
TO CAO 8
TO CAO 2
TO CAO II
TO CAD I
TO TS (A15)
TO TS (A14)
TO ESS +130V POWER DISTRIBUTING CKT
TO REMOTE TEST VOLTAGE SUPPLY CKT
TO COIN CONTROL SUPPLY
TO COIN CONTROL SUPPLY OR ESS -130V POWER DISTRIBUTING CKT
TO MISC FUSE BOARD OR FRAME FUSE PANEL
NO. 5 CROSSBAR OR NO. 1 ESS
LW OR CA
TS (E) ON UNIT
TO FAR END TEST TRK, LINE CKT, FAR END TEST TRK FOR INCREM TESTING FROM LOCAL TEST DESK, CAD 4 OR 13
TO FAR END TEST TRK, LINE CKT, CAD 4 OR 13
TO FAR END TEST TRK ON LINE CKT OR CAD 6
TO FAR END TEST TRK FOR INC REM TESTING FROM LOCAL TEST DESK
TS (F) ON UNIT
CROSS CONN TO INCOMING TRK (NON-NO TEST) NO. 1 CSER ONLY WITH EXTRA NUMBER SERIES
CROSS CONNECT TO FAR END TEST TRK OR LINE CKT OR TRANSMISSION FACILITIES
CROSS CONN TO FAR END TEST TRK, LINE CKT, OR SIGNALING CKT
CROSS CONN TO INCOMING TRK (NON-NO TEST), TEST DISTRIBUTOR CONTROL, TEST TRK FIRST SELECTOR (NON-NO TEST) OR TOUCH-TONE FREQUENCY TEST APPLIQUE CKT (SEE NOTE 1)
CROSS CONN TO INCOMING TRK (NO-TEST), TEST TRK FIRST SELECTOR (NO-TEST) OR TOUCH-TONE FREQUENCY TEST APPLIQUE CKT (SEE NOTE 1)
TO CAD 3
CROSS CONN TO INCOMING TRK (NO-TEST) NO. 1 CSER ONLY WITH EXTRA NUMBER SERIES
CROSS CONN TO MDF TEST TRK CKT
CROSS CONN TO TEST TRK AND SEL CKT
DF AS SPECIFIED
SHEET NOTES:
1. WHEN ONLY NO-TEST TEST TRUNKS ARE PROVIDED, THEY MAY BE CONNECTED TO UPPER T, R, S LEADS NORMALLY USED FOR NON-NO TEST TRK S. THIS ELIMINATES THE NEED FOR OPERATION OF (NT) RELAY FOR EACH TEST TRUNK OPERATION.
2. PROVIDE ONLY WHEN TEST VOLTAGE IS OBTAINED FROM TEST VOLTAGE SUPPLY CKT
REMOTE TESTING CIRCUIT - FAR END
SD 99311-01-G4
BELL TELEPHONE LABORATORIES INCORPORATED
ISSUE 19AC
SD-99311-01-G4

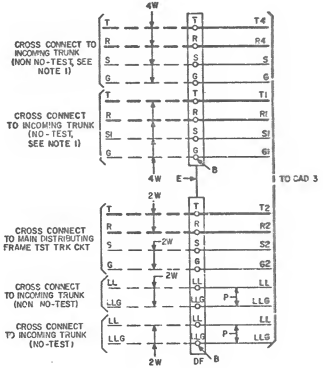
CAD 5
(FOR CAD 3)
NO.1 ESS, R OPTION



CAD 6



CAD 7
NO. 2 ESS



SHEET NOTES:
1. WHEN ONLY NO-TEST TRUNKS ARE PROVIDED, THEY MAY BE CONNECTED TO UPPER T, R, S, LL AND LLG LEADS NORMALLY USED FOR NON NO-TEST TRUNKS. THIS ELIMINATES THE NEED FOR OPERATION OF (INT) RELAY FOR EACH TEST TRUNK OPERATION.

DRAWING ISSUE 6B, 10B, 12B

ISSUE 7B

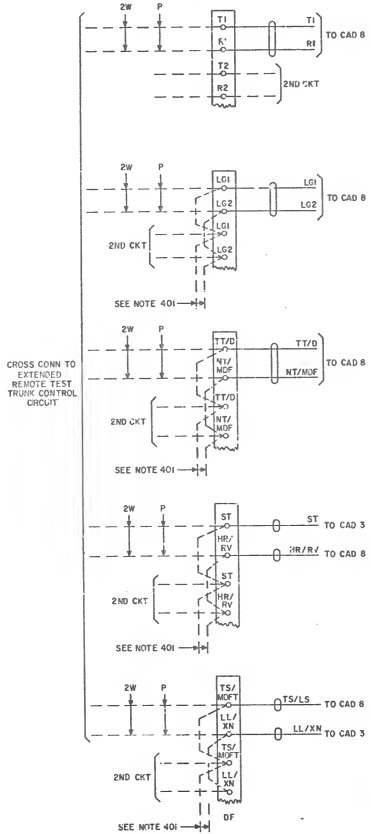
REMOTE TESTING CIRCUIT-FAR END (2) | SD-99311-01-65

BELL TELEPHONE LABORATORIES INCORPORATED | FORM 6S

SD-99311-01-65

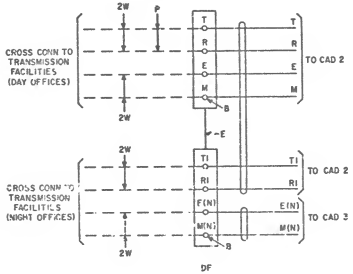
CAD 9

DISTG FRAME LEADS TO EXTENDED REMOTE TEST TRUNK CONTROL CIRCUIT



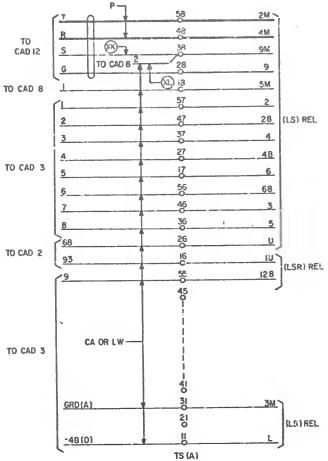
CAD 10

DISTG FRAME LEADS TO TRANSMISSION FACILITIES FOR NIGHT TEST COVERAGE



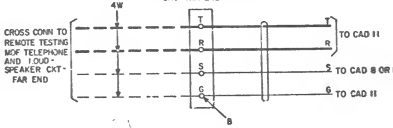
CAD 11

FOR APP FIG 9



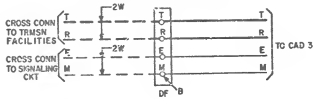
CAD 12

LEADS TO RMT TESTING MDF TELEPHONE AND LOUDSPEAKER CKT-FAR END



CAD 13

DISTG FR LEADS FOR NON-INDICATED FACILITIES



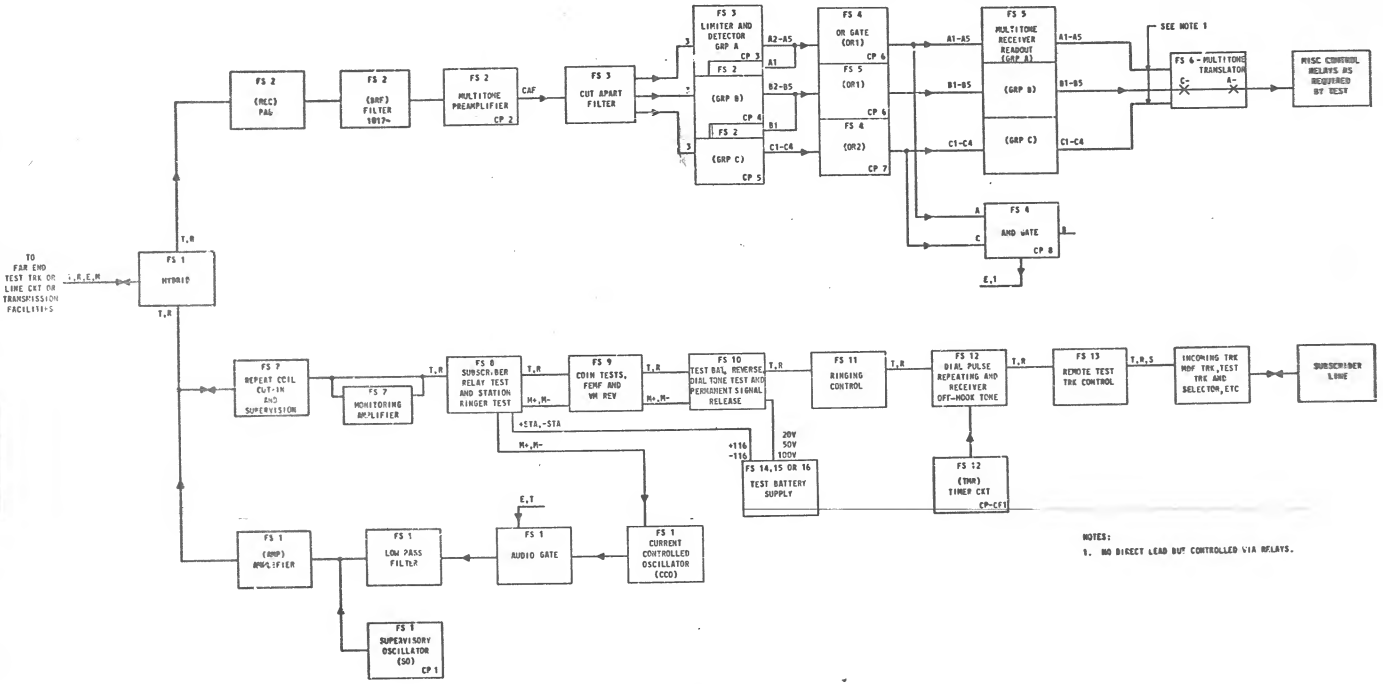
REMOTE TESTING CIRCUIT - FAR END	SD-99311-01-07
BELL TELEPHONE LABORATORIES INCORPORATED	2

19AC

SD-99311-01-07

BD I

FS BLOCK DIAGRAM



NOTES:

1. NO DIRECT LEAD BUT CONTROLLED VIA RELAYS.

6

REMOTE TESTING CIRCUIT - FAR END

SD-99311-01-HI

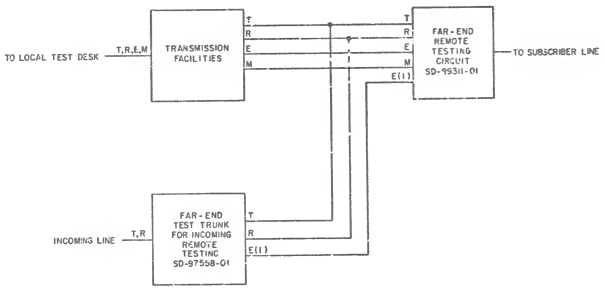
BELL TELEPHONE LABORATORIES INCORPORATED

6S

SD-99311-01-HI

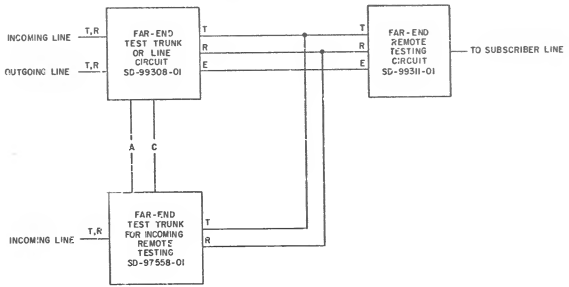
BD 2

DEDICATED SERVICE



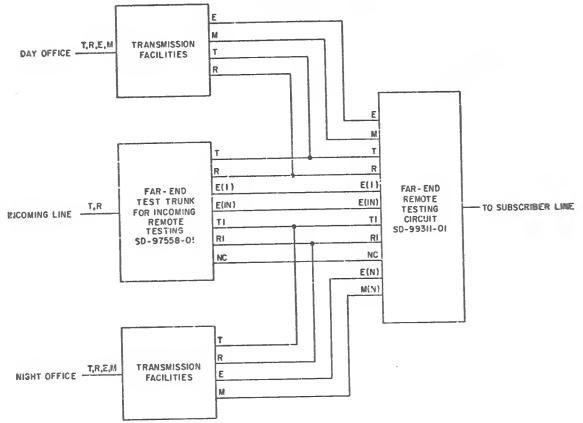
BD 3

NON-DEDICATED SERVICE



BD 4

NIGHT TEST COVERAGE
DAY & NIGHT OFFICES DEDICATED
WITH INCOMING REMOTE TESTING



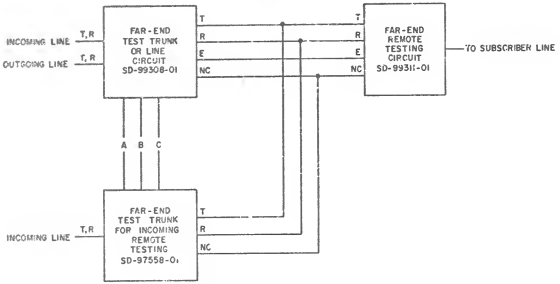
ISSUE 19 AC

REMOTE TESTING CIRCUIT-FAR END	②	SD 311-01-H2
BELL TELEPHONE LABORATORIES INCORPORATED		6S

SD-99311-01-H2

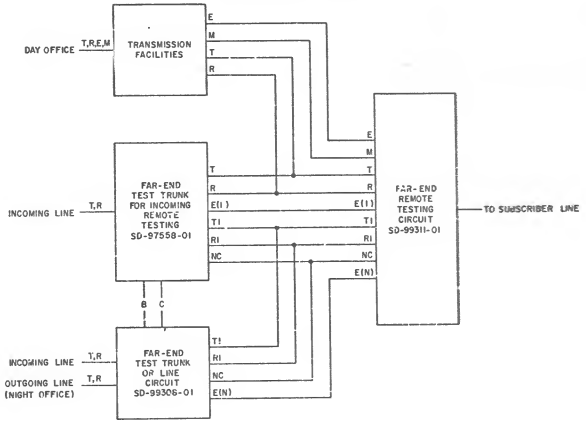
BD 5

NIGHT TEST COVERAGE
DAY & NIGHT OFFICES NON-DEDICATED
WITH INCOMING REMOTE TESTING



BD 6

NIGHT TEST COVERAGE
DAY OFFICE DEDICATED &
NIGHT OFFICE NON-DEDICATED
WITH INCOMING REMOTE TESTING



ISSUE 19AC

REMOTE TESTING CIRCUIT - FAR END

SD-99311-01-H3

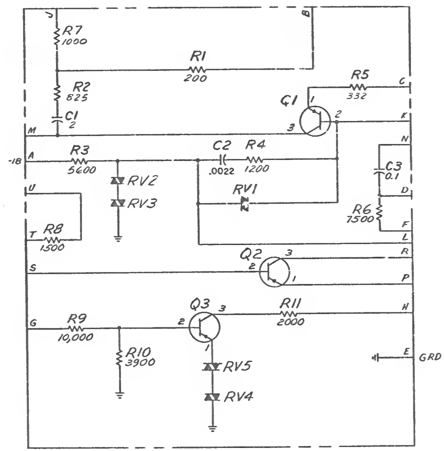
BELL TELEPHONE LABORATORIES INCORPORATED

SHEET NO. 65

SD-99311-01-H3

CPS 1

SUPERVISORY OSCILLATOR & BIAS AMP



COMPONENT LIST

CAPACITOR

DESIG	CODE
C1	542F
C2	KS-16048L1
C3	570A

RESISTOR

DESIG	CODE
R1	221A,200
R2	221A,825
R3	KS-13490L1,5600
R4	KS-13490L1,1200
R5	221A,332
R6	KS-13490 L1, 7500
R7	KS-13490 L1, 1000
R8	KS-13490 L1, 1500
R9	KS-13490 L1, 10,000
R10	KS-13490 L1, 3900
R11	KS-13490 L1, 2000

TRANSISTOR

DESIG	CODE
Q1	12G
Q2	12N
Q3	12N

VARISTOR

DESIG	CODE
RV1, RV2, RV3, RV4, RV5	100A

MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE	ED-99435-( )
ASSEMBLY DRAWING	ED-99435-( )
MANUFACTURING TEST REQUIREMENTS	
CONNECTOR OR FRAME	KS-19331L1

SYMBOL

NONE

NOTES:

1. UNLESS OTHERWISE SPECIFIED:

   RESISTANCE VALUES ARE IN OHMS.
   CAPACITANCE VALUES ARE IN MICROFARADS.
   VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS

DRAWING ISSUE
2A
3A
4D
7A
12B

12

REMOTE TESTING CIRCUIT - FAR END ②

SD-99311-01-J1

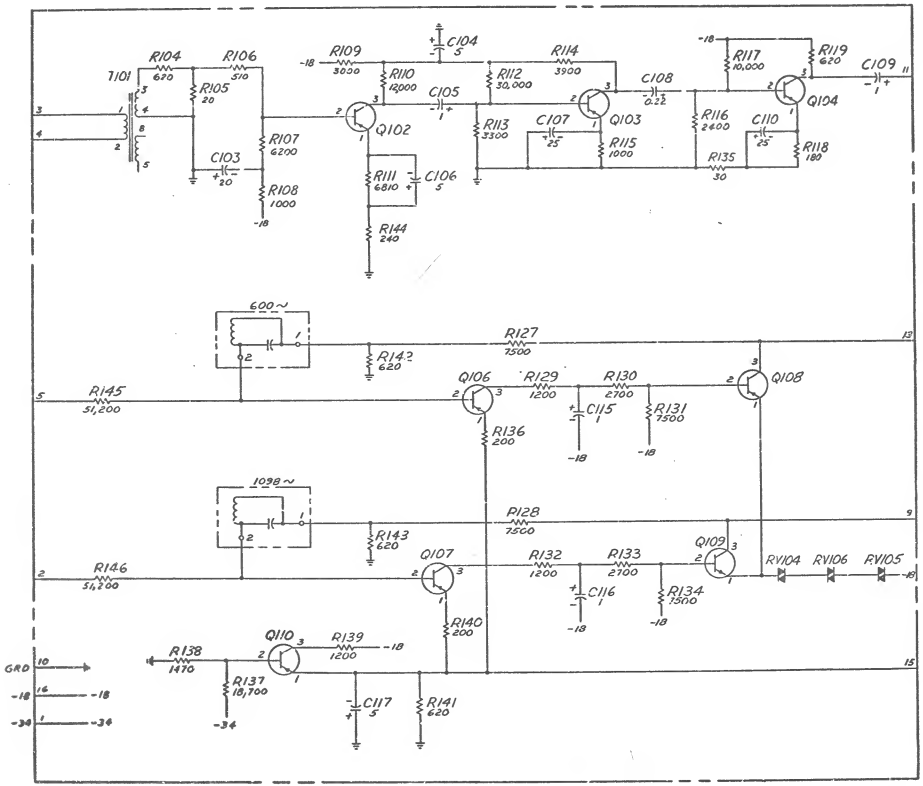
BELL TELEPHONE LABORATORIES INCORPORATED

6S

SD-99311-01-J1

PART OF CPS 2

MULTITONE PREAMPLIFIER



REMOTE TESTING CIRCUIT - FAR END	SD-99311-01-J2A
BELL TELEPHONE LABORATORIES INCORPORATED	65

SD-99311-01-J2A

7A

7

PART OF CPS 2
MULTITONE PREAMPLIFIER

COMPONENT LIST

CAPACITOR

DESIG	CODE
C103	602C
C104	601A
C105	600A
C106	601A
C107	601C
C108	ES-19107,L2,0.22,50V
C109	600A
C110	601C
C115	600A
C116	600A
C117	601A

NETWORK

DESIG	CODE
600~	4017T
1098~	4017U

RESISTOR

DESIG	CODE
R104	ES-13490,L1, 600
R105	20
R106	510
R107	6200
R108	1000
R109	3000
R110	ES-13490,L1, 12,000
R111	221, 681D
R112	ES-13490,L1, 30,900
R113	3300
R114	3930
R115	1700
R116	2496
R117	10,000
R118	140
R119	620
R127	7500
R128	7500
R129	1200
R130	2700
R131	7500
R132	1200
R133	2700
R134	7500
R135	30
R136	ES-13490,L1 200
R137	221A, 18,700
R138	221A, 1470
R139	ES-13490,L1, 1200
R140	200
R141	620
R142	620
R143	620
R144	ES-13490,L1, 240
R145	221A, 51,200
R146	221A, 51,200

COMPONENT LIST (CONT)

TRANSFORMER

DESIG	CODE
T101	254CH

TRANSISTOR

DESIG	CODE
Q102	12G
Q103	12G
Q104	12G
Q106	12G
Q107	12G
Q108	16A
Q109	16A
Q110	12G

VARISTOR

DESIG	CODE
RV104	100A
RV105	100A
RV106	100A

CIRCUIT DESCRIPTION

THIS CPS PROVIDES AN AMPLIFIER, AND TWO DETECTORS.

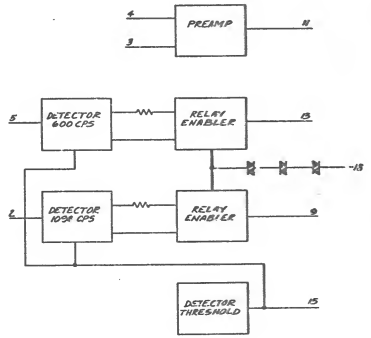
Q104, Q107, Q108, Q109 ARE DETECTORS AND RELAY ENABLERS. THEY DETECT THE PRESENCE, IN A DATA SIGNAL, OF EITHER A 600 OR 1098 CPS COMPONENT AND ALLOW A RELAY TO OPERATE IF EITHER OF THESE FREQUENCIES ARE PRESENT.

Q110 PROVIDES A BIAS THRESHOLD VOLTAGE FOR THE DETECTORS.

MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE	AA5
CONNECTOR ON FRAME	KS-16425,L2

SYMBOL



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS;
   CAPACITANCE VALUES ARE IN MICROFARADS;
   VALUES PRECEDED BY + (PLUS) OR - (MINUS) ARE IN VOLTS.

DRAWING ISSUE 2A

ISSUE 15D

REMOTE TESTING CIRCUIT-FAR END

SD 9311-01-J2B

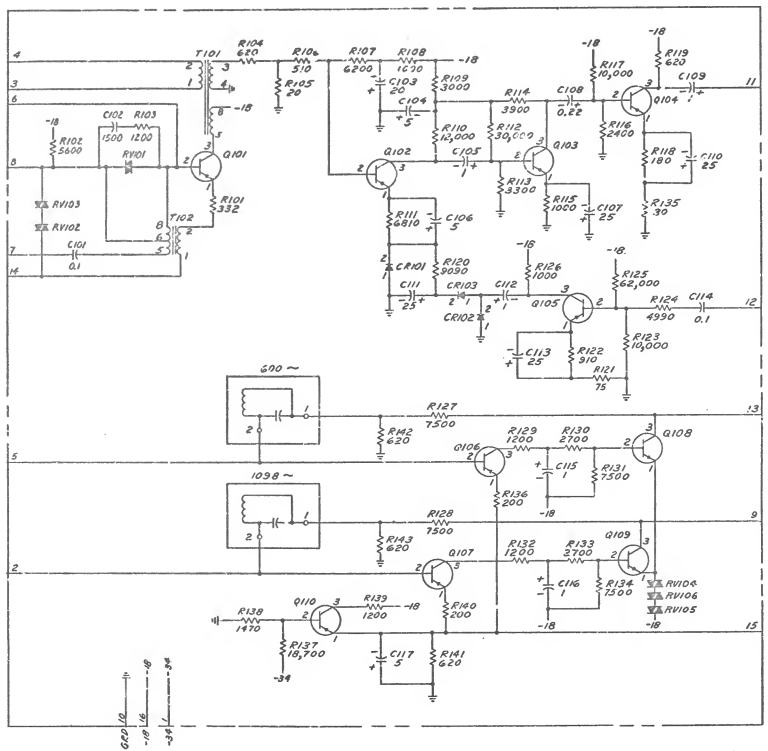
BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

SD-69311-01-J2B

PART OF CPS 2

MULTITONE PREAMPLIFIER
(SEE NOTE 1)



COMPONENT LIST

CAPACITOR

DESIG	CODE
C101	570BK
C102	KS-19057,L1
C103	602C
C104	601A
C105	600A
C106	601A
C107	601C
C108	KS-19107,L2, 0.22 ,50V
C109	600A
C110	601C
C111	601C
C112	600A
C113	601C
C114	KS-19107,L6, 0.1,50V
C115	600A
C116	600A
C117	601A

DIODE

DESIG	CODE
CR101	KS-16986,L2
CR102	KS-16986,L2
CR103	KS-16986,L2

NETWORK

DESIG	CODE
600~	4017T
1098~	4017U

RESISTOR

DESIG	CODE
R101	221A, 332
R102	KS-13490,L1, 5600
R103	1200
R104	620
R105	20
R106	510
R107	6200
R108	1000
R109	3000
R110	KS-13490,L1, 12,000
R111	221A, 6810
R112	KS-13490,L1, 30,000
R113	3300
R114	3900
R115	1000
R116	2400
R117	10,000
R118	180
R119	620
R120	221A, 9040
R121	KS-13490,L1, 75
R122	KS-13490,L1, 910
R123	KS-13490,L1, 10,000
R124	221A, 4990
R125	KS-13490,L1, 62,000
R126	1000
R127	7500
R128	KS-13490,L1, 7500

RESISTOR (CONT)

DESIG	CODE
R129	KS-13490,L1, 1200
R130	2700
R131	7500
R132	1200
R133	2700
R134	7500
R135	30
R136	KS-13490,L1, 200
R137	221A, 18,700
R138	221A, 1470
R139	KS-13490,L1, 1200
R140	200
R141	620
R142	620
R143	KS-13490,L1, 620

TRANSFORMER

DESIG	CODE
T101	254BH
T102	257AG

TRANSISTOR

DESIG	CODE
Q101-Q107	12G
Q108	14A
Q109	14A
Q110	12G

VARISTOR

DESIG	CODE
RV101-RV106	100A

MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-99669-30 (MFR DISC)
CONNECTOR ON FRAME	KS-16425,L2

SYMBOL
SEE SHEET J2B

NOTES:

1. IF ED-99669-30 FAILS AND NO ED-99669-30 ARE AVAILABLE CPS2 AS WELL AS CPS3, CPS4 AND CPS5 MUST ALL BE REPLACED BY AA5, AA6, AA7, AND AA8, RESPECTIVELY.

ISSUE 15D

REMOTE TESTING CIRCUIT-FAR END (2)

S. - 9311-01-J2C

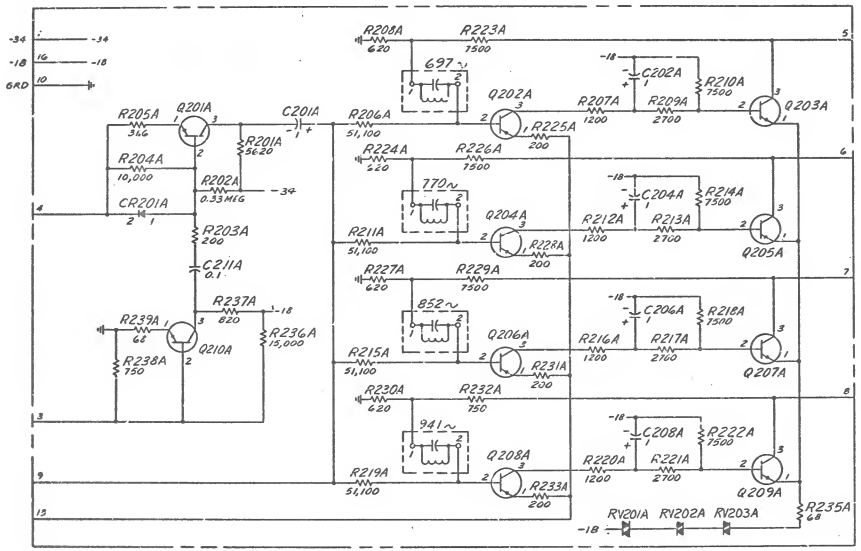
BELL TELEPHONE LABORATORIES INCORPORATED

65

SD-99311-01-J2C

PART OF CPS 3

LIMITER & DETECTOR



PART OF CPS 3
LIMITER & DETECTOR

COMPONENT LIST

CAPACITORS

DESIG	CODE
C201A	600A
C202A	↓
C204A	↓
C206A	↓
C208A	600A
C211A	KS-19107,L2, 0.1, 50V

DIODE

DESIG	CODE
CR201A	KS-16996,L2

NETWORK

DESIG	CODE
697~	4017A
770~	4017B
852~	4017C
941~	4017D

RESISTOR

DESIG	CODE
R201A	KS-20810 LIA,~~238A~~,5620
R202A	KS-13490,L1, 0.33 MEG
R203A	KS-13490,L1, 200
R204A	KS-13490,L1, 10,000
R205A	221A, 31.6
R206A	221A, 51,100
R207A	KS-13490,L1, 1200
R208A	KS-13490,L1, 620
R209A	KS-13490,L1, 2700
R210A	KS-13490,L1, 7500
R211A	221A, 51,100
R212A	KS-13490,L1, 1200
R213A	KS-13490,L1, 2700
R214A	KS-13490,L1, 7500
R215A	221A, 51,100
R216A	KS-13490,L2, 1200
R217A	KS-13490,L1, 2700
R218A	KS-13490,L1, 7500
R219A	221A, 51,100
R220A	KS-13490,L1, 1200
R221A	KS-13490,L1, 2700
R222A	KS-13490,L1, 7500
R223A	KS-13490,L1, 7500
R224A	KS-13490,L1, 620
R225A	KS-13490,L1, 200
R226A	KS-13490,L1, 7500
R227A	KS-13490,L1, 620
R228A	KS-16645,L1, 200
R229A	KS-13490,L1, 7500
R230A	KS-13490,L1, 620
R231A	KS-13490,L1, 200
R232A	KS-13490,L1, 7500
R233A	KS-13490,L1, 200
R235A	KS-13490,L1, 68
R236A	KS-16645,L1, 15,000
R237A	KS-16645,L1, 820
R238A	KS-16645,L1, 750
R239A	KS-16645,L1, 68

COMPONENT LIST (CONT)

TRANSISTOR

DESIG	CODE
Q201A	12D
Q202A	12G
Q203A	16A
Q204A	12G
Q205A	16A
Q206A	12G
Q207A	16A
Q208A	12G
Q209A	16A
Q210A	12G

VARISTOR

DESIG	CODE
RV201A	100A
RV202A	100A
RV203A	100A

CIRCUIT DESCRIPTION

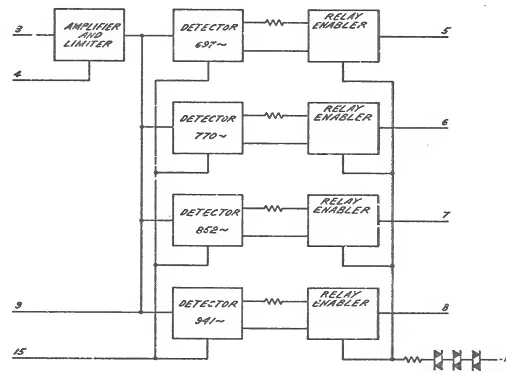
THIS CPS CONTAINS AN AMPLIFIER, A LIMITER AND FOUR DETECTORS FOR INITIAL USE IN THE REMOTE TESTING CKT—FAR END. APPLICATION IS DESCRIBED IN CD-99311-01.

Q210A IS AN AMPLIFIER AND Q201A IS A LIMITER. THE AMPLIFIER AND LIMITER SHAPE THE INCOMING DATA SIGNAL INTO A FORM SUITABLE FOR DETECTION. Q202A, Q204A, Q206A, Q208A ARE DETECTORS AND Q203A, Q205A, Q207A, Q209A ARE RELAY ENABLERS. THE DETECTORS AND RELAY ENABLERS DETECT THE PRESENCE, IN A DATA SIGNAL, OF FREQUENCIES OF 697, 770, 852 OR 941 CPS AND ALLOW EXTERNAL RELAYS TO OPERATE IF ANY OF THESE FREQUENCIES IS PRESENT.

MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE	AA6
CONNECTOR ON FRAME	KS-16425,L2

SYMBOL



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS;
   CAPACITANCE VALUES ARE IN MICROFARADS;
   VALUES PRECEDED BY + (PLUS) OR - (MINUS) ARE IN VOLTS.

DRAWING ISSUE 7A

ISSUE 17B

REMOTE TESTING CIRCUIT-FAR END

BELL TELEPHONE LABORATORIES INCORPORATED

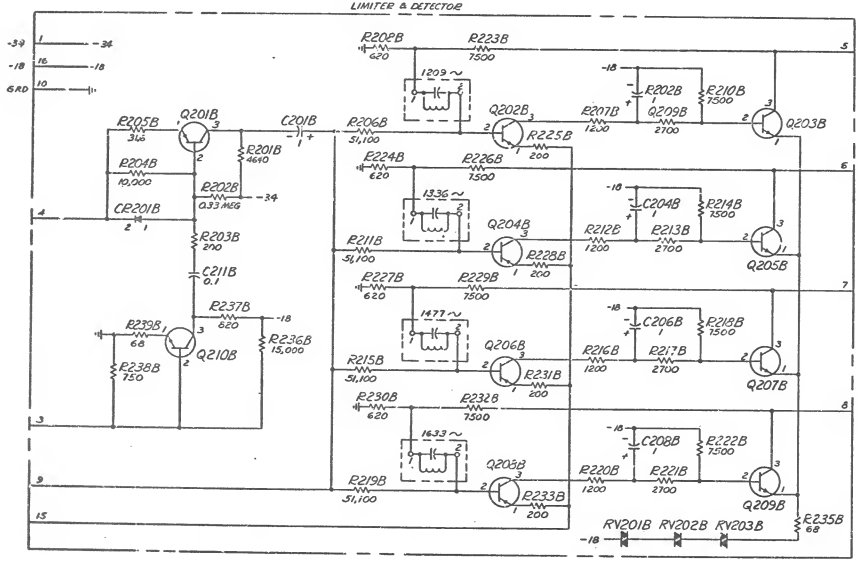
6S

SD-99311-01-J3B

SD-99311-01-J3B

PART OF CPS 4

LIMITER & DETECTOR



PART OF CPS 4
LIMITER & DETECTOR

COMPONENT LIST

CAPACITORS

DESIG	CODE
C2018	600A
C2028	↓
C2048	↓
C2068	↓
C2088	600A
C2118	KS-19107,L2, 0.1, 50V

DIODE

DESIG	CODE
CR2018	KS-16986,L2

NETWORK

DESIG	CODE
1209~	4017E
1336~	4017F
1477~	4017G
1633~	4017H

RESISTOR

DESIG	CODE
R2018	KS-20810,L1A,2388,4640
R2028	KS-13490,L1, 0.33 MEG
R2038	KS-13490,L1, 200
R2048	KS-13490,L1, 10,000
R2058	221A, 31.6
R2063	221A, 51,100
R2078	KS-13490,L1, 1200
R2088	KS-13490,L1, 620
R2098	KS-13490,L1, 2700
R2108	KS-13490,L1, 7500
R2118	211A, 51,100
R2123	KS-13490,L1, 1260
R2138	KS-13490,L1, 2700
R2148	KS-13490,L1, 7500
R2158	221A, 51,100
R2168	KS-13490,L1, 1200
R2178	KS-13490,L1, 2700
R2188	KS-13490,L1, 7500
R2198	221A, 51,100
R2208	KS-13490,L1, 1200
R2218	KS-13490,L1, 2700
R2228	KS-13490,L1, 7500
R2238	KS-13490,L1, 7500
R2248	KS-13490,L1, 620
R2258	KS-13490,L1, 200
R2268	KS-13490,L1, 7500
R2278	KS-13490,L1, 620
R2288	KJ-16645,L1, 200
R2298	KS-13490,L1, 7500
R2308	KS-13490,L1, 620
R2318	KS-13490,L1, 200
R2328	KS-13490,L1, 7500
R2338	KS-13490,L1, 200
R2358	KS-13490,L1, 48
R2368	KS-16645,L1, 15,000
R2378	KS-16645,L1, 820
R2388	KS-16645,L1, 750
R2398	KS-16645,L1, 68

COMPONENT LIST (CONT)

TRANSISTOR

DESIG	CODE
Q2018	12G
Q2028	12G
Q2038	16A
Q2048	12G
Q2058	16A
Q2068	12G
Q2078	16A
Q2088	12G
Q2098	16A
Q2108	12G

VARISTOR

DESIG	CODE
RV2018	100A
RV2028	100A
RV2038	100A

CIRCUIT DESCRIPTION

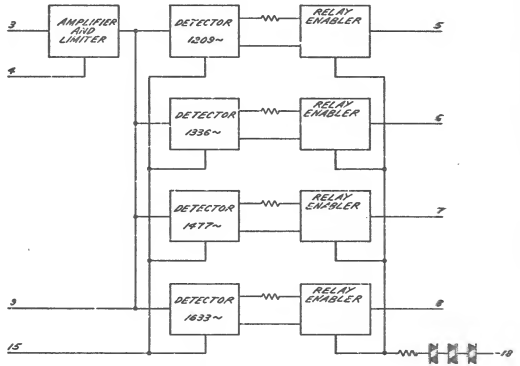
THIS CPS CONTAINS AN AMPLIFIER, A LIMITER AND FOUR DETECTORS FOR USE IN THE REMOTE TESTING CKT FAR-END. APPLICATION IS DESCRIBED IN CD-99311-01.

Q2108 IS AN AMPLIFIER AND Q2018 IS A LIMITER. THE AMPLIFIER AND LIMITER SHAPE THE INCOMING DATA SIGNAL INTO A FORM SUITABLE FOR DETECTION. Q2028, Q2048, Q2068, Q2088 ARE DETECTORS AND Q2038, Q2058, Q2078, Q2098 ARE RELAY ENABLERS. THE DETECTORS AND RELAY ENABLERS DETECT THE PRESENCE, IN A DATA SIGNAL, OF FREQUENCIES OF 1209, 1336, 1477 OR 1633 CPS AND ALLOW EXTERNAL RELAYS TO OPERATE IF ANY OF THESE FREQUENCIES IS PRESENT.

MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE	887
CONNECTOR ON FRAME	KS-15425,L2

SYMBOL



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS;
   CAPACITANCE VALUES ARE IN MICROFARADS;
   VOLTAGES PRECEDED BY + (PLUS) OR - (MINUS) ARE IN VOLTS.

DRAWING SIZE 7A

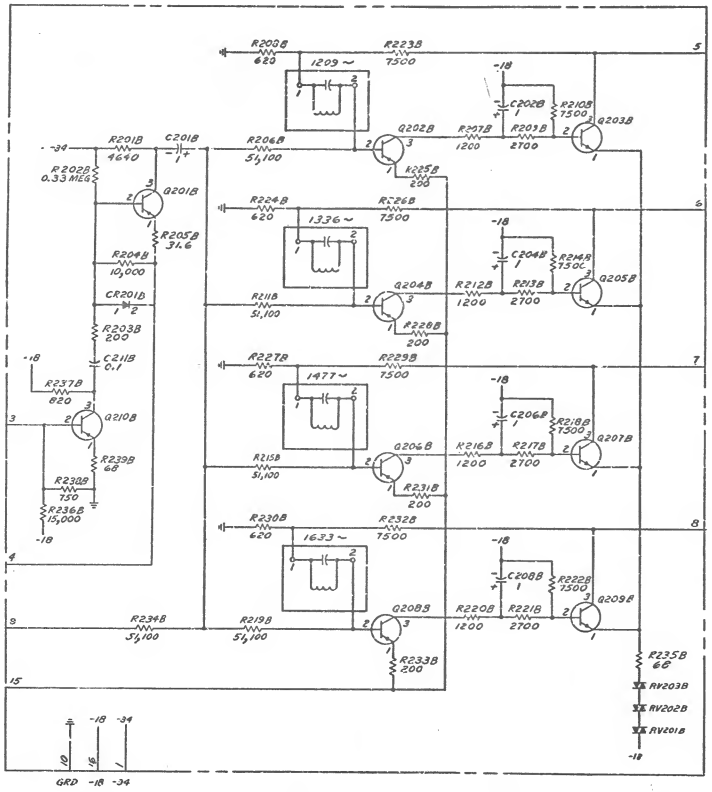
ISSUE 17B

REMOTE TESTING CIRCUIT-FAR END ②	SD-99311-01-J4B
BELL TELEPHONE LABORATORIES INCORPORATED	DRAWING 6S

SD-99311-01-J4B

PART OF CPS 4

LIMITER AND DETECTOR CIRCUIT
(1209, 1336, 1477, 1633 CPS)
(SEE NOTE 1)



COMPONENT LIST

CAPACITORS

DESIG	CODE
C201B	600A
C202B	↕
C204B	↕
C206B	↕
C208B	600A
C211B	KS-19107,L2,0.1,50V

DIODE

DESIG	CODE
CR201B	KS-16986,L2

NETWORK

DESIG	CODE
1209~	4017E
1336~	4017F
1477~	4017G
1633~	4017H

RESISTOR

DESIG	CODE
R201B	238A, 4640
R202B	KS-13490,L1,0.33 MEG
R203B	KS-13490,L1,200
R204B	KS-13490,L1,10,000
R205B	221A, 31.6
R206B	221A, 51,100
R207B	KS-13490,L1,1200
R208B	KS-13490,L1,620
R209B	KS-13490,L1,2700
R210B	KS-13490,L1,7500
R211B	221A, 51,100
R212B	KS-13490,L1,1200
R213B	KS-13490,L1,2700
R214B	KS-13490,L1,7500
R215B	221A, 51,100
R216B	KS-13490,L1,1200
R217B	KS-13490,L1,2700
R218B	KS-13490,L1,7500
R219B	221A, 51,100
R220B	KS-13490,L1,1200
R221B	KS-13490,L1,2700
R222B	KS-13490,L1,7500
R223B	KS-13490,L1,7500
R224B	KS-13490,L1,620
R225B	KS-13490,L1,200
R226B	KS-13490,L1,7500
R227B	KS-13490,L1,620
R228B	KS-16645,L1,200
R229B	KS-13490,L1,7500
R230B	KS-13490,L1,620
R231B	KS-13490,L1,200
R232B	KS-13490,L1,7500
R233B	KS-13490,L1,200
R234B	221A, 51,100
R235B	KS-13490,L1,68
R237B	KS-16645,L1,820
R238B	KS-16645,L1,750
R239B	KS-16645,L1,68

TRANSISTOR

DESIG	CODE
Q201B	120
Q202B	125
Q203B	16A
Q204B	12G
Q205B	16A
Q206B	12E
Q207B	16A
Q208B	12G
Q209B	16A
Q210B	12G

VARISTOR

DESIG	CODE
RV201B	100A
RV202B	100A
RV203B	100A

MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-99671-30 (MFR DISC)
CONNECTOR ON FRAME	KS-16425,L2

SYMBOL
SEE SHEET J4B

NOTES:

1. IF ED-99671-30 FAILS AND NO ED-99671-30 ARE AVAILABLE, CPS4, AS WELL AS CPS2, CPS3 AND CPS5 MUST ALL BE REPLACED BY AA7, AA5, AA6 AND AA8 RESPECTIVELY.

DRAWING ISSUE
2A
4D
6B
7A

ISSUE 15D

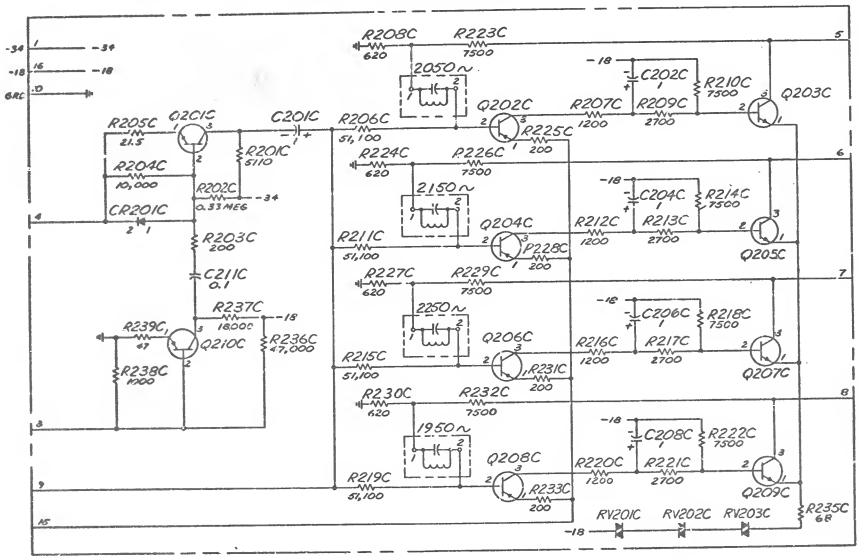
REMOTE TESTING CIRCUIT-FAR END

SD-99311-01-J4C

BELL TELEPHONE LABORATORIES INCORPORATED

SD-99311-01-J4C

PART OF OPS 5
LIMITER & DETECTOR



REMOTE TESTING CIRCUIT - FAR END

BELL TELEPHONE LABORATORIES INCORPORATED

SD-99311-01-J5A

SD-99311-01-J5A

7

PART OF CPS 5
LIMITER & DETECTOR

COMPONENT LIST

CAPACITORS

DESIG	CODE
C201C	600A
C202C	↓
C204C	↓
C206C	↓
C208C	600A
C211C	KS-19107,L2, 0.1, 50V

DIODE

DESIG	CODE
CR201C	KS-16986,L2

NETWORK

DESIG	CODE
1950~	4017W
2050~	4017J
2150~	4017K
2250~	4017L

RESISTOR

DESIG	CODE
R201C	KS-20810,L2A, 23mA;5HO
R202C	KS-13490,L1, 0.33 MEG
R203C	KS-13490,L1, 200
R204C	KS-13490,L1, 10,000
R205C	221A, 21.5
R206C	221A, 51,100
R207C	KS-13490,L1, 1200
R208C	KS-13490,L1, 620
R209C	KS-13490,L1, 2700
R210C	KS-13490,L1, 7500
R211C	221A, 51,100
R212C	KS-13490,L1, 1200
R213C	KS-13490,L1, 2700
R214C	KS-13490,L1, 7500
R215C	221A, 51,100
R216C	KS-13490,L1, 1200
R217C	KS-13490,L1, 2700
R218C	KS-13490,L1, 7500
R219C	221A, 51,100
R220C	KS-13490,L1, 1200
R221C	KS-13490,L1, 2700
R222C	KS-13490,L1, 7500
R223C	KS-13490,L1, 7500
R224C	KS-13490,L1, 620
R225C	KS-13490,L1, 200
R226C	KS-13490,L1, 7500
R227C	KS-13490,L1, 620
R228C	KS-16645,L1, 200
R229C	KS-13490,L1, 7500
R230C	KS-13490,L1, 620
R231C	KS-13490,L1, 200
R232C	KS-13490,L1, 7500
R233C	KS-13490,L1, 200
R235C	KS-13499,L1, 68
R236C	KS-16645,L1, 47,000
R237C	KS-16645,L1, 1800
R238C	KS-16645,L1, 1000
R239C	KS-16645,L1, 47

COMPONENT LIST (CONT)

TRANSISTOR

DESIG	CODE
Q201C	12J
Q202C	12J
Q203C	16A
Q204C	12J
Q205C	16A
Q206C	12J
Q207C	16A
Q208C	12G
Q209C	14A
Q210C	12G

VARISTOR

DESIG	CODE
RV201C	100A
RV202C	100A
RV203C	100A

CIRCUIT DESCRIPTION

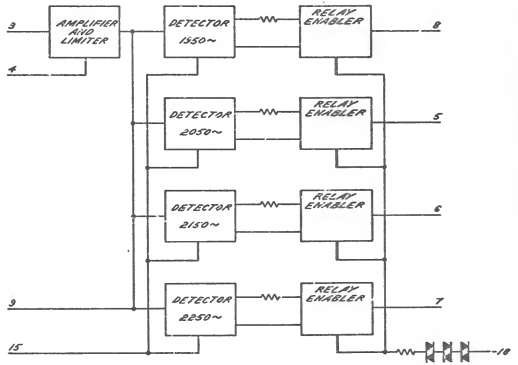
THIS CPS CONTAINS AN AMPLIFIER, A LIMITER AND FOUR DETECTORS FOR USE IN REMOTE TESTING CKT FAR-END. APPLICATION DESCRIBED IN CD-99311-01.

Q210C IS AN AMPLIFIER AND Q201C IS A LIMITER. THE AMPLIFIER AND LIMITER SHAPE THE INCOMING DATA SIGNAL INTO A FORM SUITABLE FOR DETECTION. Q202C, Q204C, Q206C, Q208C ARE DETECTORS AND Q203C, Q205C, Q207C, Q209C ARE RELAY ENABLERS. THE DETECTORS AND RELAY ENABLERS DETECT THE PRESENCE IN A DATA SIGNAL, OF FREQUENCIES OF 1950, 2050, 2150 OR 2250 CPS AND ALLOW EXTERNAL RELAYS TO OPERATE IF ANY OF THESE FREQUENCIES IS PRESENT.

MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE	AAB
CONNECTOR ON FRAME	KS-16425,L2

SYMBOL



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS;
   CAPACITANCE VALUES ARE IN MICROFARADS;
   VOLTAGES PRECEDED BY + (PLUS) OR - (MINUS) ARE IN VOLTS.

DRAWING ISSUE 7A

ISSUE 17B

REMOTE TESTING CIRCUIT-FAR END

SD-99311-01-J5B

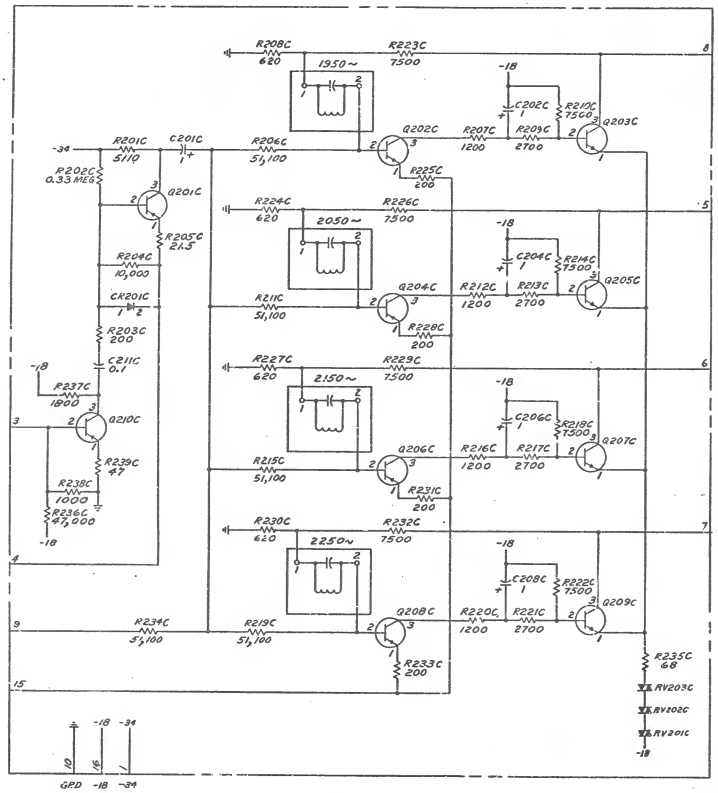
BELL TELEPHONE LABORATORIES INCORPORATED

6S

SD-99311-01-J5B

PART OF CPS 5

LIMITER AND DETECTOR CIRCUIT
(1950, 2050, 2150, 2250 CPS)
(SEE NOTE 1)



COMPONENT LIST

CAPACITORS

DESIG	CODE
C201C C202C C204C C206C	600A
C208C C211C	600A RS-19107,L2,0.1, 50V

DIODE

DESIG	CODE
CR201C	RS-16986,L2

NETWORK

DESIG	CODE
1950~	4017M
2050~	4017J
2150~	4017K
2250~	4017L

RESISTOR

DESIG	CODE
R201C	238A, 5110
R202C	RS-13490,L1,0.33 MEG
R203C	RS-13490,L1,200
R204C	RS-13490,L1,10,000
R205C	221A, 21.5
R206C	221A, 51,100
R207C	RS-13490,L1,1200
R208C	RS-13490,L1,620
R209C	RS-13490,L1,2700
R210C	RS-13490,L1,7500
R211C	221A, 51,100
R212C	RS-13490,L1,1200
R213C	RS-13490,L1,2700
R214C	RS-13490,L1,7500
R215C	221A, 51,100
R216C	RS-13490,L1,1200
R217C	RS-13490,L1,2700
R218C	RS-13490,L1,7500
R219C	221A, 51,100
R220C	RS-13490,L1,1200
R221C	RS-13490,L1,2700
R222C	RS-13490,L1,7500
R223C	RS-13490,L1,7500
R224C	RS-13490,L1,620
R225C	RS-13490,L1,200
R226C	RS-13490,L1,7500
R227C	RS-13490,L1,620
R228C	RS-16645,L1,200
R229C	RS-13490,L1,7500
R230C	RS-13490,L1,620
R231C	RS-13490,L1,200
R232C	RS-13490,L1,7500
R233C	RS-13490,L1,200
R234C	221A, 51,100
R235C	RS-13490,L1,68
R236C	RS-16645,L1,47,000
R237C	RS-16645,L1 1800
R238C	RS-16645,L1 1000
R239C	RS-16645,L1,47

MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-99672-30 (MFR DISC)
CONNECTOR ON FRAME	RS-16425,L2

SYMBOL

SEE SHEET J5B

TRANSISTOR

DESIG	CODE
Q201	12D
Q202	12G
Q203	16A
Q204	12G
Q205	16A
Q206	12G
Q207	16A
Q208	12G
Q209	16J
Q210	12G

VARISTOR

DESIG	CODE
RV201	100A
RV202	100A
RV203	100A

NOTES:

1. IF ED-99672-30 FAILS AND NO ED-99672-30 ARE AVAILABLE CPS5 AS WELL AS CPS2, CPS3, AND CPS4 MUST ALL BE REPLACED BY AA6, AA5, AA6 AND AA7, RESPECTIVELY.

ISSUE 15D

REMOTE TESTING CIRCUIT-YAR END (2) SD-99311-01-J5C

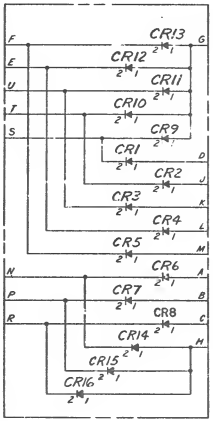
BELL TELEPHONE LABORATORIES INCORPORATED 65

SD-99311-01-J5C

COMPONENT LIST

CIRCUIT CR16	CODE
CR1	
CR2	
CR3	
CR4	
CR5	
CR6	
CR7	445A
CR8	
CR9	
CR10	
CR11	
CR12	
CR13	
CR14	
CR15	458A
CR16	

CPS 5
OR GATE



MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE	ED-99436-( )
ASSEMBLY DRAWING	ED-99436-( )
MANUFACTURING TEST REQUIREMENTS	
CONNECTOR ON FRAME	KS-19337L1

SYMBOL
NONE

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS,
   CAPACITANCE VALUES ARE IN MICROFARADS,
   VOLTAGES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.

DRAWING ISSUE
2A
3A
4D
7A
12B

12

REMOTE TESTING CIRCUIT - FAR END

SD-99311-01-J6

BELL TELEPHONE LABORATORIES INCORPORATED

65

SD-99311-01-J6

COMPONENT LIST

DIODE

DESIG	CODE
CR1	446A
CR2	
CR3	
CR4	
CR5	
CR6	
CR7	
CR8	
CR9	
CR10	446A
CR11	426P
CR12	458A

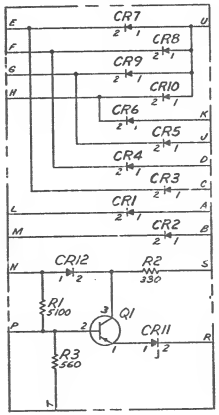
RESISTOR

DESIG	CODE
R1	KS-13490 L9, 5100
R2	KS-13491 L9, 330
R3	KS-13490 L9, 560

TRANSISTOR

DESIG	CODE
Q1	12W

CPS7
OR GATE



MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE	ED-99437-( )
ASSEMBLY DRAWING	ED-99437-( )
MANUFACTURING TEST REQUIREMENTS	
CONNECTOR ON FRAME	KS-19339 L1

SYMBOL

NONE

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS,
   CAPACITANCE VALUES ARE IN MICROFARADS,
   VALUES PRECEDED BY THE SYMBOL + (PLUS)
   OR - (MINUS) ARE IN VOLTS.

ISSUE
2A
3A
4D
7A

7

REMOTE TESTING CIRCUIT - FAR END

BELL TELEPHONE LABORATORIES INCORPORATED

SD- 99311-01-J7

SD-99311-01-J7

COMPONENT LIST

DIODE

DESIG	CODE
CR1	444R
CR2	444R
CR3	444R
CR4	458A
CR5	458A
CR6	458A
CR7	458A

RESISTOR

DESIG	CODE
R1	221A,21,500
R2	9,090
R3	5110
R4	9,090
R5	221A,5110
R6	KS-16266L3A,1540
R7	221A,10,000
R8	0.1 MEG
R9	1100
R10	1400
R11	5110
R12	221A,46,400

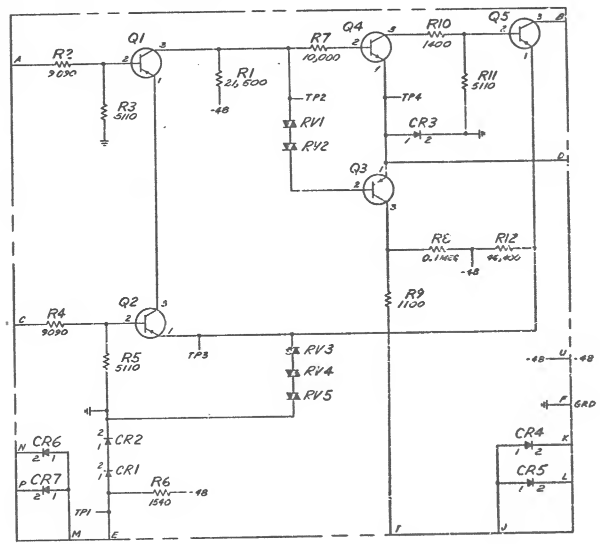
TRANSISTOR

DESIG	CODE
Q1	12H
Q2	12H
Q3	12N
Q4	21E
Q5	12N

VARISTOR

DESIG	CODE
RV1	1000
RV2	
RV3	
RV4	
RV5	1000

CPS 8
AND GATE



MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE	ED-99438-( )
ASSEMBLY DRAWING	ED-99438-( )
MANUFACTURING TEST REQUIREMENTS	
CONNECTOR ON FRAME	KS-19331L1

SYMBOL

NONE

NOTES:

1. UNLESS OTHERWISE SPECIFIED:

   RESISTANCE VALUES ARE IN OHMS.
   CAPACITANCE VALUES ARE IN MICROFARADS.
   VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS

DRAWING ISSUE: 2A, 3A, 4D, 7A

7

REMOTE TESTING CIRCUIT - FAR END

SD-99311-01-J8

BELL TELEPHONE LABORATORIES INCORPORATED

6S

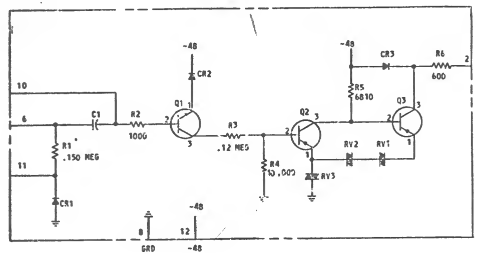
SD-99311-01-J8

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE	CF1
CONTROLLING DRAWING	SD-32371-01
MANUFACTURING TEST REQUIREMENTS	
CONNECTOR ON FRAME	KS-19437,L1

CPS CF1

TIMING CIRCUIT



INPUT/OUTPUT INFORMATION

INPUT:

-48 VOLTS IS APPLIED TO TERM. 6.

OUTPUT:

600 OHM GROUND AT TERMINAL 2.

CIRCUIT DESCRIPTION

TERM. 8 CONNECTS TO GROUND, TERM. 12 CONNECTS TO -48 VOLT BATTERY, TERM. 2 CONNECTS TO AN EXTERNAL RELAY TO BE TIMED. TERMINAL 10 CONNECTS TO AN EXTERNAL PRECISION RESISTOR WHICH, WITH (C1), DETERMINES THE TIMING INTERVAL. NORMALLY TERM. 6 IS OPEN AND GROUND THROUGH THE EXTERNAL RESISTOR AT TERM. 10 ALLOWS CURRENT TO FLOW TO THE BASE OF (Q1), HOLDING (Q1) ON. THE EMITTER OF (Q1) IS CONNECTED TO -48 VOLTS THROUGH (CR2) AND, SINCE VERY LITTLE VOLTAGE IS LOST ACROSS (CR2) OR THE BASE-EMITTER JUNCTION OF (Q1), THE BASE OF (Q1) IS ALSO AT ABOUT -48 VOLTS. THUS (C1) HAS A CHARGE OF NEARLY -48 VOLTS SINCE ITS OTHER SIDE IS CONNECTED TO GROUND THRU RESET RESISTOR (R1) AND (CR1). (Q1) ON HOLDS (Q2) ON BY SUPPLYING CURRENT TO THE BASE OF (Q2) THRU (R3). WITH (Q2) ON THE BASE OF (Q3) IS CLAMPED TO THE EMITTER OF (Q3) THRU VARISTORS (RV1) AND (RV2), HOLDING (Q3) OFF. (RV1) AND (RV2) PROVIDE REVERSE BIAS TO HOLD (Q3) OFF, (RV3) AND (R4) PROVIDE REVERSE BIAS TO EVENTUALLY HOLD (Q2) OFF. WHEN TERM. 6 IS CONNECTED TO -48 VOLTS BY ACTION OF EXTERNAL CIRCUITS THE -48 VOLT CHARGE ON (C1) DRIVES THE BASE OF (Q1) TO -96 VOLTS, REVERSE BIASING IT AND TURNING IT OFF. (Q1) OFF TURNS (Q2) OFF SO THAT CURRENT THRU (R5), WHICH FORMERLY FLOWED THROUGH (Q2), NOW FLOWS THRU THE BASE OF (Q3) TURNING (Q3) ON. THIS OPERATES AN EXTERNAL RELAY CONNECTED TO TERM. 2. THE RELAY WILL REMAIN OPERATED AS LONG AS (Q1) AND (Q2) REMAIN OFF, ALLOWING (Q3) TO REMAIN ON. AS CHARGE LEAKS OFF (C1) THRU THE EXTERNAL RESISTOR AT TERM. 10 THE BASE VOLTAGE OF (Q1) SLOWLY RETURNS TO -48 VOLTS. WHEN IT REACHES ABOUT -48 VOLTS (Q1) WILL TURN BACK ON, TURNING (Q2) ON, (Q3) OFF, AND RELEASING THE EXTERNAL RELAY. (R6) AND (R2) LIMIT CURRENT THRU THE TRANSISTORS IN CASE DIRECT BATTERY IS INADVERTENTLY CONNECTED TO TERMINAL 2 OR 10. (CR3) PROTECTS (Q3) FROM SURGE VOLTAGES WHEN THE EXTERNAL RELAY RELEASES. (CR1) PREVENTS FALSE OPERATION DUE TO ANY SMALL FLUCTUATIONS IN THE -48 VOLT SUPPLY. THE TIME INTERVAL FROM THE START SIGNAL TO THE START OF RELEASE OF THE OUTPUT RELAY IS t = 0.715 RC ± 5% WHEN ±1% COMPONENTS ARE USED FOR R AND C.

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS
   CAPACITANCE VALUES ARE IN MICROFARADS.
   VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.

DRAWING ISSUE 6B 10B

10

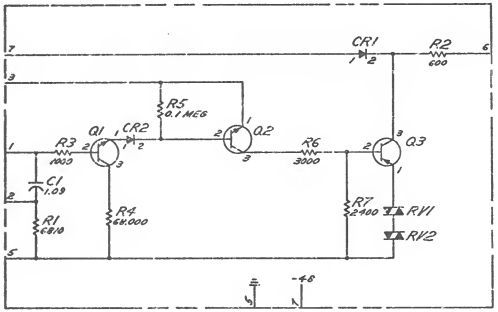
REMOTE TESTING CIRCUIT - FAR END ②

SD-99311-01-J9

BELL TELEPHONE LABORATORIES INCORPORATED 65

SD-99311-01-J9

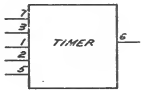
CPS D3
TIMER



MANUFACTURING REFERENCES

CATEGORY	NUMBER
CONTROLLING DRAWING	SD-52371-01
CIRCUIT PACK CODE	D3
CONNECTOR ON FRAME	910A

SYMBOL



INPUT/OUTPUT INFORMATION

THIS INFORMATION IS INCLUDED IN THE CIRCUIT DESCRIPTION.

CIRCUIT DESCRIPTION

THIS CIRCUIT IN CONJUNCTION WITH A START CONTACT, AN EXTERNAL RESISTOR AND AN OUTPUT RELAY PROVIDES A VARIABLE TIME INTERVAL BETWEEN INPUT AND OUTPUT.

THE CIRCUIT PACK EXTERNAL CONNECTIONS ARE AS FOLLOWS: TERM. 1 CONNECTS THRU TIMING RESISTANCE (R) TO GROUND; TERM. 2 CONNECTS TO -48V BATTERY THRU THE START (MAKE) CONTACT; TERM. 2 ALSO CONNECTS TO ONE TERMINAL OF THE OUTPUT RELAY WHOSE OTHER TERMINAL CONNECTS TO TERM. 6 OF THIS CIRCUIT; TERM. 3 & 7 CONNECT TO -48V; TERM. 5 IS GROUNDED.

WITH START CONTACT NORMAL (OPEN), TRANSISTORS (Q1), (Q2) AND (Q3) ARE FORWARD BIASED AND ARE IN THE "ON" STATE. EVEN THOUGH (Q3) IS "ON" THE OUTPUT RELAY CANNOT OPERATE BECAUSE THE START CONTACT IS OPEN, KEEPING OPERATING BATTERY OFF ITS WINDING.

WHEN START CONTACT CLOSES, TERMINAL 2 SIDE OF CAP.(C1) WHICH WAS AT GROUND POTENTIAL CHANGES TO -48V, CAUSING IN TURN THE POTENTIAL OF SIDE 1 TO CHANGE FROM ABOUT -46V TO ABOUT -94V. THIS REVERSE BIASES TRANSISTOR (Q1) WHICH TURNS "OFF". IN TURN CAUSING TRANSISTORS (Q2) AND (Q3) TO TURN OFF.

CAPACITOR(C1)STARTS DISCHARGING TOWARDS GROUND THRU EXTERNAL TIMING RESISTOR (R). WHEN TERMINAL 1 REACHES ABOUT -46V, TRANSISTORS (Q1) AND (Q3) AND DIODE (CR2) ARE FORWARD BIASED ENOUGH TO TURN "ON". THIS CAUSES TRANSISTOR (Q3) TO CONDUCT AND OPERATE THE OUTPUT RELAY.

WHEN THE START CONTACT IS OPENED THE OUTPUT RELAY IS RELEASED AND CAPACITOR (C1) RECHARGES FOR TRANSISTORS (Q1) AND (Q2) AND RESISTORS (R1) AND (R3) UNTIL TERMINAL 1 IS ABOUT -46V. THE CIRCUIT IS NOW RECYCLED AND READY FOR ANOTHER START SIGNAL. THE TIME INTERVAL BETWEEN THE START SIGNAL AND THE TIME WHEN THE OUTPUT RELAY STARTS TO OPERATE IS t = 0.715 RC ± 5% WHEN ± 1% COMPONENTS ARE USED FOR (R)AND(C). MAXIMUM VALUE FOR (R) IS 4.33 MEG.

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS;
   CAPACITANCE VALUES ARE IN MICROFARADS;
   VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.

DRAWING ISSUE 7A 108

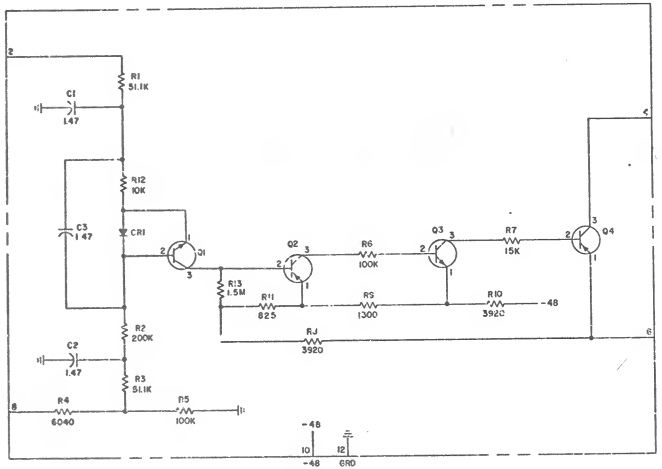
10

REMOTE TESTING CIRCUIT-FAR END (2) SD-99311-01-J10

BELL TELEPHONE LABORATORIES INCORPORATED

SD-99311-01-J10

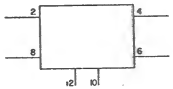
② CPS 9
RING TRIP



MANUFACTURING REFERENCES

CATEGORY	NO.
CONTROLLING DRAWING	SD-2H116-01
CIRCUIT PACK CODE	ED-2H053-( ) GROUP 3
CONNECTOR ON FRAME	NONE

SYMBOL



INPUT/OUTPUT INFORMATION

-48V IS CONNECTED TO TERMINAL 10 AND GROUND TO TERMINAL 12. TERMINAL 4 CONNECTS TO A RELAY WINDING HAVING -48V ON THE WINDING. A GROUND IS APPLIED TO TERMINAL 6, TO ACTIVATE THE CIRCUIT. A DC VOLTAGE FROM THE RINGING SUPPLY IS APPLIED TO TERMINALS 2 AND 8 ACROSS A 200 OHM RESISTOR.

CIRCUIT DESCRIPTION

THIS CIRCUIT IS USED TO DETECT WHEN A TELEPHONE BEING RUNG IS ANSWERED. DURING RINGING THE DC COMPONENT OF THE RINGING SIGNAL HOLDS THE COMMON POINT OF R3, R4 AND R5 POSITIVE WITH RESPECT TO TERMINAL 2. THIS TURNS ON ALL TRANSISTORS AND HOLDS THE RELAY ON TERMINAL 4 OPERATED. WHEN THE TELEPHONE GOES TO OFF-HOOK THE POLARITY, APPLIED FROM TERMINAL 2 TO THE COMMON POINT OF R3, R4 AND R5, REVERSES. THIS BIASES Q1 OFF WHICH SHUTS OFF Q2, Q3 AND Q4, RELEASING THE OUTPUT RELAY.

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS
   CAPACITANCE VALUES ARE IN MICROFARADS
   VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS

DRAWING ISSUE 12B 13AR

ISSUE 10AC

REMOTE TESTING CIRCUIT-FAR END ②

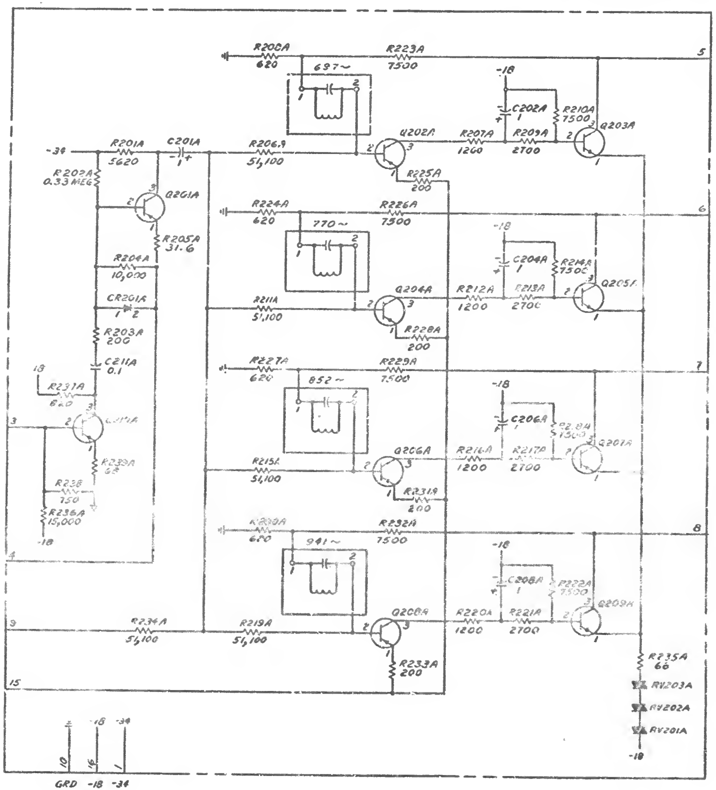
SD-5 3311-01-J11A

BELL TELEPHONE LABORATORIES INCORPORATED 65

SD-693I-01-J11A

PART OF CPS 3

LIMITER AND DETECTOR CIRCUIT (697, 770, 852, 941 CPS) (SEE NOTE 1)



COMPONENT LIST

CAPACITORS

DESIG	CODE
C201A	600A
C202A	↕
C204A	↕
C206A	↕
C208A	600A
C211A	KS-19107,L2,0.1,50V

DIODE

DESIG	CODE
CR201A	KS-16986,L2

NETWORK

DESIG	CODE
697~	4017A
770~	4017B
852~	4017C
941~	4017D

RESISTOR

DESIG	CODE
R201A	238A, 5620
R202A	KS-13490,L1,0.33 MEG
R203A	KS-13490,L1,200
R204A	KS-13490,L1,10,000
R205A	221A ,31.6
R206A	221A, 51,100
R207A	KS-13490,L1,1200
R208A	KS-13490,L1,620
R209A	KS-13490,L1,2700
R210A	KS-13490,L1,7500
R211A	221A, 51,100
R212A	KS-13490,L1,1200
R213A	KS-13490 L1,2700
R214A	KS-13490,L1,7500
R215A	221A, 51,100
R216A	KS-13490,L1,1200
R217A	KS-13490,L1,2700
R218A	KS-13490,L1,7500
R219A	221A, 51,100
R220A	KS-13490,L1,1200
R221A	KS-13490,L1,2700
R222A	KS-13490,L1,7500
R223A	KS-13490,L1,7500
R224A	KS-13490,L1,620
R225A	KS-13490,L1,200
R226A	KS-13490,L1,7500
R227A	KS-13490 L1,620
R228A	KS-16645,L1,200
R229A	KS-13490,L1,7500
R230A	KS-13490,L1,620
R231A	KS-13490,L1,200
R232A	KS-13490,L1,7500
R233A	KS-13490,L1,200
R234A	221A, 51,100
R235A	KS-13490,L1 68
R236A	KS-16645,L1,15,000
R237A	KS-16645,L1,820
R238A	KS-16645,L1,750
R239A	KS-16645,L1,68

MANUFACTURING REFERENCES

CATEGORY	NUMBER
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-99670-30 (MFR DISC)
CONNECTOR ON FRAME	KS-16425,L2

SYMBOL
SEE SHEET J3B

TRANSISTOR

DESIG	CODE
Q201A	12D
Q202A	12G
Q203A	16A
Q204A	12G
Q205A	16A
Q206A	12G
Q207A	16A
Q208A	12G
Q209A	16A
Q210A	12G

VARISTOR

DESIG	CODE
RV201A	100A
RV202A	100A
RV203A	100A

NOTES:

1. IF ED-99670-30 FAILS AND NO ED-99670-30 ARE AVAILABLE CPS3 AS WELL AS CPS2, CPS4 AND CPS5 MUST ALL BE REPLACED BY AA6, AA5, AA7, AND AA8, RESPECTIVELY.

DRAWING ISSUE: 2A, 4D, 6B, 7A

ISSUE 15D

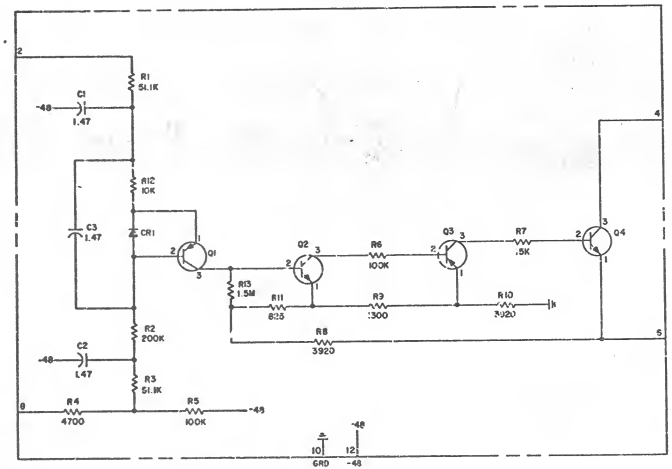
REMOTE TESTING CIRCUIT-FAR END ②

BELL TELEPHONE LABORATORIES INCORPORATED | 6S

SD-99311-01-J3C

CPS 9

RING TRIP



MANUFACTURING REFERENCES

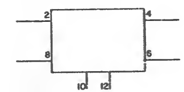
CATEGORY	NO.
CONTROLLING DRAWING	SD-2H126-02
CIRCUIT PACK CODE	ED-2H114-( ),G1
CONNECTOR ON FRAME	———

INPUT/OUTPUT INFORMATION

TERMINAL CONNECTIONS

TERMINAL	
10	GROUND
12	-48
6	-48
4	A 640 OHM RELAY WINDING TO THE MIDPOINT OF A VOLTAGE DIVIDER (464Ω, 1870Ω, -48, GRD) WITH A 446 TYPE DIODE CONNECTED IN A BACK DIRECTION ACROSS THE RELAY WINDING
8	GROUND OR 200Ω GROUND
2	200Ω GROUND OR GROUND

SYMBOL



CIRCUIT DESCRIPTION

THIS CIRCUIT PACK IS INTENDED TO BE USED FOR TRIPPING RINGING TO CUSTOMER LOOPS EXTENDING TO 3000 OHMS. IT IS INSENSITIVE TO 20HZ OR RINGING CURRENT BUT SENSITIVE TO CUSTOMER D.C. TRIPPING CURRENT. WITH CONNECTIONS MADE AS STATED IN INPUT/OUTPUT INFORMATION, THE RELAY CONNECTED TO TERMINAL 4 IS HELD OPERATED. IT WILL REMAIN OPERATED WHILE RINGING THE CUSTOMER TELEPHONE. WHEN A CUSTOMER GOES OFF-HOOK, THE DC CURRENT THAT FLOWS THROUGH A 200 OHM RESISTOR BRIDGED ACROSS TERMINALS 2 AND 6 IS DETECTED AND CAUSES THE RELAY CONNECTED TO TERMINAL 4 TO RELEASE. THE RELAY RELEASED CAUSES THE RINGING TO BE TRIPPED.

NOTES:

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS. VALUES PRECEDED BY THE SYMBOL + (PLUS) OR − (MINUS) ARE IN VOLTS.
2. ⏚ GROUND RETURN

ISSUE 19AC

REMOTE TESTING CIRCUIT-FAR END ②

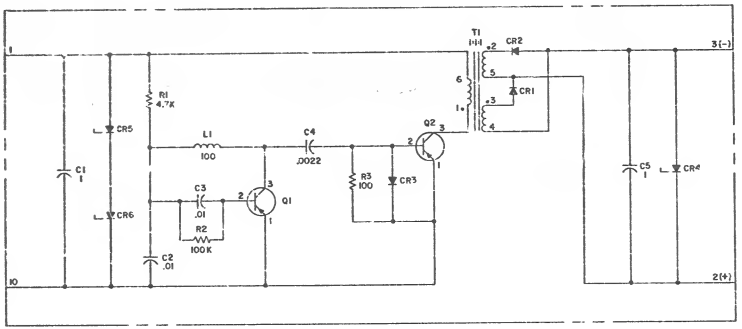
BELL TELEPHONE LABORATORIES INCORPORATED

6S

SD 99311-01-J11B

CPS 10

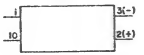
DC TO DC CONVERTER



MANUFACTURING REFERENCES

CATEGORY	NO.
CONTROLLING DRAWING	SD-2H114-01
CIRCUIT PACK CODE	ED-2H052-( )
CONNECTOR ON FRAME	NONE

SYMBOL



INPUT/OUTPUT INFORMATION

INPUT IS GROUND ON TERMINAL 10 AND -48V THRU AN EXTERNAL 316 OHMS RESISTOR TO TERMINAL 1. OUTPUT IS FLOATING 24V ON TERMINALS 2(+) AND 3(-).

CIRCUIT DESCRIPTION:

THE 48V SUPPLY IS REDUCED AND REGULATED AT 27V BY THE EXTERNAL RESISTOR AND INTERNAL ZENER DIODES CR5 AND CR6. C1 IS PART OF AN OSCILLATOR WHOSE FREQUENCY IS DETERMINED BY THE TUNED CIRCUIT L1, C2 AND C4 (ABOUT 300 KHz). THE BASE AND EMITTER OF Q2 IS IN THE TUNED CIRCUIT SO Q2 IS TURNED ON AND OFF BY THE OSCILLATOR. Q2 ACTS AS A SWITCH FOR CURRENT IN THE PRIMARY WINDING OF T1. VOLTAGE INDUCED IN THE SECONDARY WINDINGS IS RECTIFIED BY CR1 AND CR2 AND FILTERED BY C5. DIODE CR4 LIMITS THE OUTPUT VOLTAGE UNDER NO LOAD AND KEEPS THE TRANSFORMER VOLTAGES FROM RISING TO DAMAGING VALUES. ALSO CR4 PROTECTS THE CIRCUIT FROM TRANSIENTS ON THE LOAD, SUCH AS FROM LIGHTNING ON A SUBSCRIBER LINE.

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS.
   CAPACITANCE VALUES ARE IN MICROFARADS.
   VALUES PRECEDED BY "+" SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.

DRAWING ISSUE 128 HW

12

REMOTE TESTING CIRCUIT-FAR END (2) SD-99311-01-J12

BELL TELEPHONE LABORATORIES INCORPORATED 6S

SD-99311-01-J12